

# BULLETIN OF MISCELLANEOUS INFORMATION Appendix I 1930 ROYAL BOTANIC GARDENS, KEW

## REVIEW OF THE WORK OF THE ROYAL BOTANIC GARDENS, KEW, DURING 1929.

### General.

STAFF.—The most noteworthy changes during 1929 were the retirement of the Curator, Mr. W. J. Bean, I.S.O., after forty-six years' service at Kew, and of Mr. C. H. Wright, A.L.S., for forty-five years an Assistant in the Herbarium. Mr. Bean was succeeded as Curator by Mr. T. W. Taylor, Assistant Curator in charge of the Tropical Department, the vacancy thus created being filled by the promotion of a Sub-foreman, Mr. L. Stenning. Mr. F. Ballard, B.Sc., was appointed an Assistant to fill the vacancy caused by the retirement of Mr. Wright. An additional post of Assistant, with special reference to the preparation of the *Index Kewensis*, was substituted for that of Sub-Assistant, and was filled by the transfer of Miss M. L. Green, B.A., who had occupied the latter post. Dr. J. M. Cowan vacated his appointment as Temporary Botanist and Mr. H. K. A. Shaw, B.A., acted as a Temporary Botanist in his place until the return of Mr. J. Hutchinson from South Africa, when Miss M. B. Moss, who had been seconded to fill Mr. Hutchinson's place during his absence, reverted to her substantive post as Temporary Botanist.

A grant from the Empire Marketing Board, for the purpose of providing additional herbarium assistance at Kew for the Dominions and Colonies, permitted the addition to the staff of two Temporary Assistants and two Temporary Sub-Assistants. Mr. N. Y. Sandwith, B.A., a Temporary Botanist, and Mr. C. E. Hubbard, a Sub-Assistant, were appointed Temporary Assistants, and the posts of Temporary Sub-Assistants were filled by Mr. E. W. B. H. Milne-Redhead, B.A., and Mr. A. A. Bullock, B.Sc. The post of Temporary Botanist was filled by the appointment of Mr. H. K. A. Shaw who had previously served in an acting capacity. A second clerical officer and an additional shorthand-typist were added to the Herbarium staff.

EMPIRE MARKETING BOARD.—In addition to continuing the grants recorded in last year's Review (*Kew Bulletin* Appendix I, 1929, p. 1), the Empire Marketing Board has made a grant of £1200, alluded to in the preceding paragraph, for the purpose of providing additional herbarium assistance at Kew for the

Dominions and Colonies, and another of £700 for procuring and distributing, within the Empire, seeds of the Tung-oil trees (*Aleurites Fordii* and *A. montana*). A further reference to this grant appears on p. 8.

OFFICIAL VISITS.—The ASSISTANT DIRECTOR returned to Kew on the 25th March (*K.B.* 1929, App. 1, p. 4). An extensive tour of the Anglo-Egyptian Sudan included first a visit to Dongola Province, thence to Khartoum, and along the Blue Nile to The Fung. After returning to Khartoum a southern excursion was made with a digression westwards to El Nahud in Kordofan, thence southwards through the Nuba Mountains to Tonga, where the Bahr-el-Gebel was followed to Rejaf. The western part of Mongalla Province was visited, and later the central portion (*K.B.* 1929, pp. 177-197). On returning to Khartoum a report was made to the Government on forest policy and organisation, local horticultural problems and staff requirements, a scheme for training subordinate staffs in botanical departments, and items of general economic importance in the south of the country. During the year various matters arising out of the report have been discussed and further investigations have been followed up.

Before returning to England a visit was made to Sicily to enquire into various botanical problems.

MR. H. C. SAMPSON, Economic Botanist, was asked by the Secretary of State for the Colonies, at the request of the Government of the Gold Coast, to attend the Second West African Agricultural Conference which was held in that Colony in the latter half of October. He was also requested by the Secretary of State to take the opportunity thus offered of visiting the other West African Dependencies. He left this country on October 2nd and returned on January 21st of the following year. During the time at his disposal he was able to see the work which was being carried out by the several local Departments of Agriculture, and in addition was able to form a very fair idea of the existing state of agriculture in West Africa. Thanks are due to the Governments concerned and to their officers, especially those who accompanied him on his journeys, for the very thorough arrangements which were made for giving Mr. Sampson a full opportunity of seeing as much as possible of these Colonies and their local agriculture.

With the object of attending the meetings of the British Association for the Advancement of Science and of visiting the various botanical institutions with which Kew has for so long been in intimate correspondence, the KEEPER OF THE HERBARIUM paid an official visit last summer to South Africa and parts of British East Africa. He left Kew on June 29th and reached Cape Town on July 19th, the British Association meetings being held at Cape Town during the following week and at Johannesburg the week after.



At the Association meetings Mr. Cotton met practically all the botanists of South Africa and during his stay at Cape Town he visited the Bolus Herbarium, National Botanic Gardens, Kirstenbosch, the Herbarium in the South African Museum, and the Botanical Department and Herbarium in the new University buildings at Rondebosch. On his way to Johannesburg he visited the Karoo Garden at Matjesfontein and the Herbarium at the McGregor Museum, Kimberley, which Miss Wilman has done so much to build up.

Time was also set aside to visit the important Department of Botany in the University at Johannesburg and the numerous agricultural and botanical centres at Pretoria. After spending a short time at the Natal University College at Pietermaritzburg and the Natal Herbarium and Botanic Gardens at Durban, he travelled north into Southern Rhodesia, making a brief call at Bulawayo in order to examine the Herbarium in the Museum and the Government Farm at Matopas. A longer stay was made at Salisbury in order to see something of the various activities of the Departments of Agriculture and Forestry, especially with regard to pasture plant problems and plant pathology. Plans to collect material with a view to the elaboration of a systematic Flora were also discussed. The next stay was at the East African Agricultural Research Station, Amani, Tanganyika Territory, and en route he was able to call at Umtali, Beira, Dar-es-Salaam, Zanzibar and Tanga, and see something of the agricultural development in these districts. Considerable attention was paid to the research in progress at Amani. Here problems of phytopathology, soil-chemistry and systematic botany were among the earliest to receive attention on the re-opening of the Institution, while of those now being investigated by the more recently appointed staff, bio-chemistry and plant breeding are the most noteworthy.

On leaving Amani Mr. Cotton, in company with Dr. A. S. Hitchcock of the Bureau of Plant Industry, U.S. Department of Agriculture, visited the coffee-growing centre at Moshi and had the unexpected opportunity of spending a few days on the slopes of Kilimanjaro. During this time a collection of seeds and dried plants was made which has added to the Kew Herbarium several species not hitherto represented and three species hitherto undescribed. Thence they travelled via Taveta and Voi and proceeded to Nairobi where most of the time was spent in the Forestry Department and the Department of Agriculture. Kew was reached on October 5th.

MR. J. HUTCHINSON made a botanical tour in South Africa (see *K.B.* 1929 : 273-285, with map, and *K.B. App.* 1, 1929, p. 5), leaving England at the end of July, 1928, and returning on April 29th, 1929. Most of the time was devoted to the study and collection of specimens representative of the vegetation of South Africa. After spending some time on the Cape Peninsula, he made a tour of Namaqualand and Bushmanland. The principal flower-shows

in the Cape Province were visited and some time was spent at the National Botanic Gardens, Kirstenbosch, and the Bolus Herbarium. At the end of October, with a companion, he started on a long journey by the coast route from Cape Town to Durban. From Durban he proceeded to Pretoria, where he joined General Smuts and Mr. and Mrs. Arthur Gillett, whom he accompanied on a collecting trip as far north as the Limpopo River, in the Northern Transvaal. The Zoutpansberg Mountains, which, botanically, are little known, were explored, and trips were made to the reserve at Dongola and to Lake Fundusi and Woodbush. He accompanied Dr. Pole Evans to the Barberton District and the Blaauwberg, and later he visited the Belfast Area. A circular tour was then made along the Magaliesberg to Mafeking and Vryburg, when experimental and agricultural stations were visited. From Pretoria he proceeded south via Kimberley, whence he traversed the little known Kaap Plateau and Asbestos Mountains. He returned southwards via Bloemfontein, Fauresmith, Graaff Reinet, Meirings Poort and Mossel Bay, arriving at Cape Town at the end of March.

Mr. Hutchinson collected over 3000 species of plants, of most of which he was able to secure four to five sets of specimens. Two of these sets have been presented to South Africa, one to the National Herbarium, Pretoria, and the other to the Bolus Herbarium, the botanists at both of these institutions having generously assisted him in his work. A large number of living succulent plants were forwarded to Kew for cultivation, and on the homeward voyage Mr. Hutchinson took care of four Wardian cases of rare plants from the Kirstenbosch Botanic Gardens.

Last summer Mr. N. Y. SANDWICH, of the Herbarium Staff, accompanied the Oxford University Expedition to British Guiana as one of the botanists (*K.B.* 1929, pp. 237, 238). His object was to collect herbarium material with a view to an intensive study of the flora of the Colony, in particular material of the forest trees. Many of these provide valuable timber and are at present known to foresters only by their vernacular names, as they have never been identified with certainty. The Expedition sailed on July 19th and arrived at Georgetown on August 5th, spending days *en route* at Barbados, Grenada, and Trinidad, where it was entertained by the Imperial College of Tropical Agriculture, and by Mr. R. O. Williams, Assistant Botanist, with whom the two botanists visited the Botanic Gardens and the St. Clair Experiment Station. A few days were spent in Georgetown in making the preparations necessary for an expedition into the forest. The Forestry Department very kindly lent two of their best native Indians, conversant with the vernacular names, for felling trees, and a third for looking after the collecting presses in camp; while Mr. T. A. W. Davis, Assistant Conservator of Forests, accompanied the party for the whole trip. Needless to say, his knowledge and help were invaluable to the success of the botanical investigation.



The Expedition left Georgetown on August 10th, and crossing the Demerara River by ferry, took the train to Parika on the Essequibo River, where it boarded the public steam-launch and proceeded upstream to Bartica, arriving just before dark. The next morning the whole party, now joined by eleven native servants, embarked with personnel, luggage and camp equipment on the expedition boats, and made its way to its destination on the Moraballi Creek, which flows into the right bank of the Essequibo some ten miles above Bartica. Here an excellent site for a camp was chosen about two miles above the mouth, and for the next fifteen weeks the Expedition carried out its work of investigating a small and typical area of tropical rain forest. The weather was wet until about the middle of October, when a comparatively dry season set in which lasted for a month. The Acting Governor, Mr. C. D. Douglas-Jones, C.M.G., accompanied by the Conservator of Forests, Mr. B. R. Wood, paid a visit to the Expedition; and Mr. E. B. Martyn, Government Botanist and Mycologist, spent a fortnight in camp. Two excursions were made to the first falls of the Essequibo, where the numerous islets abound in interesting low trees and in species of Podostemonaceae. On November 19th, the Expedition struck camp and moved for the last week to a site on the right bank of the Cuyuni River just below the first falls. From here it was possible to examine Beebe's ecological area at Kartabo Point, as well as Kartabo Road, and the secondary growth by the portage road at Camaria Landing.

The party returned to Georgetown on November 28th and took ship for Trinidad on November 30th. Mr. R. O. Williams entertained the botanists, Messrs. Sandwith and P. W. Richards, for two days, showing them the high woods at Morne Bleu, Aripo Savannah, and the Pitch Lake. The Expedition arrived in London on December 21st. Mr. Sandwith was able to collect over 700 numbers, comprising over 2900 sheets of flowering plants, trees and climbers, while a very large number of cryptogams was collected by Mr. P. W. Richards.

DR. J. M. COWAN left Kew in February on an expedition to Persia for the purpose of studying agricultural and horticultural methods and to make a collection of the representative plants of the country.

After travelling through Palestine and across the Syrian Desert from Damascus to Baghdad, the route followed lay through Kermanshah, Hamadan, Sultanabad, Isfahan, Qum, Teheran and Tabriz to Urumia. Later an excursion was made to Astara on the Caspian Sea. Owing to disturbances among the Kurdish tribes, it was not possible to visit much of the western frontier region, but from Urumia an extended tour was made in the Tergavar and Mergavar Districts and some of the mountains towards the frontier were explored. A large collection of bulbs as well as seeds, cuttings and 2500 specimens for the Herbarium, were sent to Kew. On the

return journey Dr. Cowan visited the Botanic Gardens at Tiflis, Batum, and Vienna.

An opportunity was offered by the Secretary of State for the Colonies, to attach a botanist to the Joint British and Italian Boundary Commission in Somaliland. The Director was able to arrange for Mr. C. L. COLLENETTE, a naturalist with experience of Tropical Africa, Brazil, and the Far East, to join this expedition. (*K.B.* 1929, pp. 238, 239). Mr. Collenette arrived at Berbera in August and has since accompanied the Commission. Excellent sets of herbarium specimens have been received from him, and from his letters he appears to be making a thorough examination of the country on each side of the boundary (*K.B.* 1929, p. 322).

Kew was also fortunate in being able to employ as a collector, in the Solomon Islands, Mr. J. H. L. WATERHOUSE, formerly Head Master of the School and Training College at Roviana, New Georgia, and an authority on the native languages of the Solomons. While stationed at Roviana, Mr. Waterhouse had interested himself in the flora and had at various times sent collections to Kew. He gladly availed himself of the opportunity to return to the islands and devote himself uninterruptedly for some months to botanical collecting. Despite adverse weather conditions, ill health, and unrest amongst the natives due to the discovery of gold in New Georgia, Mr. Waterhouse was able to make extensive collections, while his familiarity with the native languages enabled him to acquire very full information as to the plants collected. A large number of these are of considerable economic and ethnological interest while many also are remarkable botanically. Owing to the position of the islands between New Guinea on the one hand and the Pacific Islands proper on the other, their flora is of great interest in linking up these two floras.

The foregoing visits were all rendered possible thanks to the grant received from the Empire Marketing Board for overseas missions and collecting purposes.

In addition the following visits were undertaken by members of the staff during the year :—

Mr. A. D. COTTON attended the Congress of the South Eastern Union of Scientific Societies held at Brighton in June, 1929, and as president of the Botanical Section delivered an address entitled "The Importance of the Study of Systematic Botany," which was published in The Proceedings and Transactions of the Union for 1929, pp. 33-44.

Early in the year Miss WAKEFIELD visited the Herbarium at the Botanical Gardens and Museums at Berlin, and the Cryptogamic Herbarium of the Jardin des Plantes at Paris, in order to examine types of African fungi, in connection with work on the fungus flora



of Uganda. At Berlin the whole of the Polyporaceae were worked through as well as certain other genera. At Paris special attention was also given to Polyporaceae, both in the general herbarium and in that of Montagne. An opportunity was afforded of attending a meeting of the Société Mycologique de France, and thus of meeting many of the French workers.

Mr. C. A. SMITH, Assistant for South Africa, visited the herbaria at Brussels, Berlin, Zürich and Geneva (Conservatoire Botanique) in February, in connection with the preparation of a revision of the South African species of *Senecio* sect. *Paucifolii*, which have assumed considerable importance in connection with poisoning of stock. The opportunity was taken to examine also numerous type-specimens of South African Vitaceae, for the purposes of a memoir on the subject. Altogether about 600 specimens were examined.

Mr. W. DALLIMORE, Keeper of Museums, was delegated to attend the International Congress of Forestry Experimental Stations, held in Sweden between July 14th and August 4th. At this Congress a week was devoted to papers and discussions on various aspects of silvicultural research, and two weeks were spent in visiting some of the more important forest areas, and commercial undertakings connected with timber, in the country, where methods of Swedish silviculture and timber handling and conversion could be seen and studied. At the Congress he contributed a paper on "Arboriculture as an Aid to Silvicultural Research." An account of the tour was given in *K. B.* 9, 1929, pp. 287-302.

The DIRECTOR also attended this Conference and in the course of his tour visited the Herbaria at Copenhagen, Lund, Stockholm and Upsala and also the Botanic Gardens, and renewed acquaintance with the Directors and the botanists in Denmark and Sweden.

MR. F. N. HOWES, Assistant, Museums, attended the Annual Meeting of the Museums Association, held in Worthing in July, as the official delegate from Kew. At these Annual Meetings papers are read and discussions held on various phases of Museum work.

MR. C. P. RAFFILL, Assistant Curator, Temperate Department, visited the French and Italian Rivas in March for the purpose of studying cultivated plants in private and public gardens. Among establishments visited were those of Mr. Cecil Hanbury, M.P., at La Mortola, H.R.H. The Duke of Connaught at Cap Ferrat, and H.H. the Prince of Monaco.

IMPERIAL INSTITUTE COMMITTEES.—Close co-operation with the Imperial Institute in works of economic importance for the Empire continued to form an important feature of the overseas activities of Kew. The pioneer stage of all problems dealing with plant products is first undertaken by Kew, close touch being kept through its representatives on the Imperial Institute Committees. The Director, who is on the Board of Governors, continued to serve on the Advisory Council on Plant and Animal Products, and also as Chairman of the Advisory Committee on Oils and Oilseeds.

Advisory Committees on which there are representatives from Kew are those dealing with Oils and Oilseeds, Essential Oils and Resins, Vegetable Fibres, Tanning Materials, and Timbers.

TUNG-OIL.—The Empire Marketing Board made a grant of £700 for the purpose of procuring and distributing, within the Empire, seeds of the Tung-oil trees (*Aleurites Fordii* and *Aleurites montana*), and for the purchase of commercial samples from different sources for analytical and technical research. In the administration of this grant Kew is co-operating with the Tung-oil Sub-Committee of the Imperial Institute Advisory Committee on Oils and Oilseeds. Much time has been devoted to the furtherance of the efforts which are being made to test thoroughly the suitability of different parts of the Empire for the cultivation of these trees. The results of previous seed distribution have been followed up, samples of Empire-grown fruits are being collected for examination, and a further distribution of seed has been made, more especially to those parts of the Empire where previous trials show indications of the successful cultivation of this valuable oil-seed.

INTERNATIONAL BOTANICAL CONGRESS, 1930. The Director has been appointed a Vice-President of the Congress and the Assistant Director is one of the Secretaries. Four members of the Herbarium Staff are Secretaries of their respective Sections :—Mr. A. D. Cotton and Dr. T. A. Sprague, Section of Taxonomy and Nomenclature ; Dr. W. B. Turrill, Section of Phytogeography and Ecology ; Miss E. M. Wakefield, Section of Mycology and Plant Pathology. Heavy duties in connection with the arrangement of the Congress and the programmes for the Sections have fallen on the Secretaries.

OTHER ACTIVITIES.—The Director has been appointed by the Lords Commissioners of His Majesty's Treasury to be the representative of the Treasury for a term of five years on the Committee of Management for the administration of the Chelsea Physic Garden.

The Director has also been appointed to serve on an Advisory Committee on Forestry Research, which has been constituted by the Forestry Commissioners at the instance of the Research Co-ordination Sub-Committee of the Committee of Civil Research.

At the meeting of the British Association for the Advancement of Science, held in South Africa, the Director was appointed President of Section K for the meeting of the Association to be held at Bristol in 1930.

The Assistant Director was appointed by the Lord President of the Council, on the nomination of the Minister of Agriculture and Fisheries, to be a member of the Empire Timbers Committee of the Forest Products Research Board.

The Assistant Director was also appointed to serve on the Advisory Committee on Timbers of the Imperial Institute.



PRESENTATIONS.—Lady Thiselton-Dyer has presented an excellent photograph of Sir William Thiselton-Dyer taken in the year 1896.

Sir David Prain has also very generously presented the tinted crayon drawing of himself, which was presented to him by one hundred and seven of his botanical and other friends. This very beautiful and characteristic drawing was made by Miss F. A. de Biden Footner during the past summer. It is now exhibited with the portraits of Sir William Hooker, Sir Joseph Hooker and Sir William Thiselton-Dyer in the visitors' room at the Herbarium.

PUBLICATIONS.—The Volume of the *Kew Bulletin* for 1929 contained ten Numbers and three Appendices. References to other publications by members of the Staff at Kew will be found under the respective Sections.

The seventh Supplement of the *Index Kewensis* was published during the year. It covers the quinquennial period 1921-1925 (*K. B.* 1929, pp. 323, 324).

COURSES OF INSTRUCTION.—Special courses of instruction were again arranged, at the request of the Secretary of State for the Colonies, for officers on leave from scientific departments in the Colonies.

### The Gardens.

VISITORS.—The number of visitors to the Gardens in 1929 was 1,169,900, an increase of 42,897 on the figures of the preceding year. The severe weather in February and unsettled weather during April were responsible for a decrease of 114,000 during the first four months of the year as compared with the corresponding period in 1928. During the months May-July there was a decrease of 63,000, but between August and December there was an increase of nearly 220,000.

The greatest monthly attendance was in August with 237,466, the least being January with 7,781. The highest daily attendance was 54,730 on Whit-Monday, May 20th, and the lowest 8 on January 29th. It may be noted that commencing on August Bank Holiday, August 5th, 1929, the penny charge for admission to the Gardens was abolished.

PLANT HOUSES.—The interior of the Mexican House and the south end of the Palm House have been repainted. The Economic Houses (11-12), the Orchid Houses (13-14), Succulent House (5) and several small plant houses in the Office Yard were overhauled, and in some cases considerable repairs were made to the woodwork owing to decay, whilst the internal iron parts were thoroughly cleaned of rust and repainted. During the summer months H.M. Office of Works installed in the Palm House stokeholds six large sectional boilers. These have replaced the old and worn out

horizontal tubular boilers, which had, for several winters past, given cause for anxiety, it being a common occurrence for two or more to be out of action at the same time. The old boilers had done service for over 50 years, but it is doubtful whether any part, other than the front diaphragm, of the original boilers remained. Many of the tubes have been renewed several times during that period.

ROCK GARDEN.—In October work was commenced on the north end of the rock garden, where extensive alterations are being made. At the present time (January, 1930) the work is still in progress; it is hoped to have the re-building completed by the end of February, by which time the area adjacent to the rose pergola will show considerable change and be greatly improved. The rock garden itself will be much enlarged; some idea of the extent of the re-building may be gathered from the fact that about 200 tons of sandstone, from East Grinstead, Sussex, have been used.

IRIS GARDEN.—During the early autumn, the beds were re-arranged so as to permit room for a large collection of the best garden varieties of Iris. Special mention must be made of the Orpington Nurseries Company, by whose generosity the collection has been greatly enriched by the addition of several new varieties.

The species which had been grown in the small beds were removed to a situation alongside the pond, near Museum No. 1, where it is hoped they will benefit by the moister conditions.

ARBORETUM.—The winter of 1929 was one of the severest experienced at Kew for many years, and in consequence a number of shrubs suffered much injury. The greatest number of losses occurred among Ericas, of which *E. mediterranea* and *E. Veitchii* suffered the most. Many fine plants were killed, and several years must elapse before the young plants attain similar dimensions.

Among shrubs growing on a west wall, the following were killed to the ground level:—*Aristotelia Macqui*, *Caesalpinia japonica*, *Escallonia illinita*, *Hydrangea altissima* and *Ribes speciosum*. A large plant of the common Myrtle on a south wall also suffered similar damage. The losses among the large and interesting collection of tender shrubs growing in the recesses of the Temperate House are deplorable, as nearly two hundred species were either killed or badly injured, many of them being fine specimens which had withstood the winters for several years past. The following are a few of the most noteworthy:—*Camellia rosaeiflora*, *Escallonia floribunda*, *Fabiana imbricata*, *Fremontia mexicana*, *Loropetalum chinense*, *Olearia Forsteri* and *Tricuspidaria lanceolata*.

The exceptionally late spring was very favourable to flowering trees and shrubs, it being several years since there has been such a wealth of blossom with no frosts or cold winds to damage it; consequently it continued in full beauty for a much longer period than is usual.



The prolonged drought and hot sunny weather during the summer and autumn months necessitated much artificial watering among the tree and shrub collections, as it was only by continuous watering that Rhododendrons and other surface-rooting subjects were kept alive. As in 1921 the lawns suffered severely from the effects of drought and heat ; in places where there is a concentration of traffic the turf was worn bare and past recovery. This necessitated a considerable amount of re-turfing during the latter part of the year, the turf for this work being obtained from the less frequented parts of the gardens, where it is more convenient to re-sow with grass seeds in the spring.

The brilliance of colour produced by the abundant crops of fruits and berries on many trees was of outstanding merit, and not for a number of years have the Crataegus, Pyrus and Hollies been so heavily laden. A long dry summer is not usually conducive to the autumn colouring of deciduous trees and shrubs, the reason being that the leaves often become shrivelled before the season of colour arrives. Last year, however, was an exception, as a number of trees and shrubs produced some wonderful colour effects until late in November.

The last two months of the year will long be remembered for the excessive rainfall and boisterous gales which occurred in all parts of the country/ During the great storm of Friday, 6th December, several large trees were blown down, among them being the magnificent Turkey Oak which stood on the slope at the south-west end of the Rhododendron Dell. Not only was this tree a conspicuous feature, but its spreading branches afforded shade to the rhododendrons for some distance around it. In its fall much havoc was done to these plants, among which were some very old specimens of the first hybrids raised in this country.

Another large tree of which the disappearance is greatly to be regretted is one of the Horse Chestnuts near the Main Gate. Although not uprooted it was so badly damaged that it had to be taken down. Other noteworthy trees brought down by the gale were a large *Celtis occidentalis* growing near the Economic Houses, and a "Judas Tree" (*Cercis Siliquastrum*) in Cambridge Cottage Garden. Neither was a particularly fine tree, but they were probably the oldest specimens in the Gardens.

In addition to the above mentioned, three large Beeches and an Elm were uprooted, and a considerable number of large branches were broken off many other trees by the wind.

The incessant and heavy rains of the past two months have cleaned all the evergreen and other trees and shrubs, and freed them from all soot and dirt ; the grass lawns have also been unusually bright green for the same reason. This welcome washing of the trees and shrubs, which are usually soot-begrimed in winter, besides adding to the beauty of the Gardens, will doubtless be very beneficial to the plants themselves.

ITEMS OF SPECIAL INTEREST.—The exhibition of interesting subjects in House 14c continues to attract much attention. Among exhibits arranged during the year the following are noteworthy :—A collection of tropical and hardy Gourds, all of which had been grown in the Gardens ; examples of plants bearing Tendrils showing different types of development ; a collection of the modern garden varieties of Chrysanthemum, with examples of the species from which they have evolved ; Pelargoniums and the derived modern garden “ Geraniums.”

For the third year in succession a plant of the “ Giant Aroid,” *Amorphophallus Titanum*, has flowered at Kew. The specimen, which flowered in September, was the last of three tubers received from Mr. A. de Kock, of Sumatra, early in 1927.

Another interesting plant that flowered during the year was *Pelargonium Cotyledonis*. This remarkable species was sent by Mr. Bruins-Lich, a former Kew student gardener, now Horticulturist at St. Helena. Mr. Bruins-Lich states that it grows on rocky cliffs in almost inaccessible places.

STUDENT GARDENERS.—There were fairly considerable changes in the personnel during the year ; nineteen men completed their training, while the new entrants numbered twenty.

Nine of the men who left secured positions at home—four in various Parks Departments : two as temporary technical assistants in the Herbarium, Kew : three in private gardens or nurseries. Six men proceeded to appointments overseas, their destinations being British Columbia, the Republic of Honduras the Botanic Garden, Kirstenbosch, South Africa, the garden of Mr. Cecil Hanbury at La Mortola, Mentone and Singapore. One Student Gardener who came to Kew from New Zealand, proceeded to University College, Reading, for a year’s study, and three foreigners, whose term of service is for one year only, returned to their own countries, Germany, Italy and Sweden respectively.

Sixteen of the new entrants came from botanic, public or private gardens or commercial nurseries in the British Isles ; of the remainder there are three from the Colonies—two being from South Africa and one from New Zealand, and one foreigner, an Italian, from Mr. Hanbury’s garden at La Mortola.

THE NEW SUNDIAL.—Professor C. Vernon Boys has constructed and presented a sundial which has been erected on a pillar which was one of the balusters of the old Kew Bridge. This stands in the centre of the Medicinal Garden in Cambridge Cottage Garden. The pillar was presented by Mr. George Hubbard, F.S.A.

The dial is in the form of a Greek cross and is constructed of gun-metal. The castings were worked up and the dial was constructed by Professor Boys himself. It consists of five equal cubes and one trapezium-shaped support, all with plain faces only. It was



necessary that the 36 surfaces should be produced all truly square to one another, and of equal dimensions for the cubes, but containing the angle of the colatitude for the support.

The dial, being in the form of a Greek cross, has eight outer edges. If such a cross were to be laid flat at the Pole, these edges would be all parallel to the axis of the earth; and since the sun, when above the horizon as in summer, appears to travel round the sky, each of these edges would cast a shadow for three hours on a face of the adjacent cube. So the eight faces would take it turn and turn about for three hours each, and the shadow would be found on one of the cubes throughout the 24 hours. If, instead of being laid level at the Pole, the dial were removed to any other part of the earth and was then placed parallel to its supposed position at the Pole, it would then equally receive, on one or other face, three hours for each, the moving shadow of one or other edge. As in these latitudes the sun is never above the horizon before 3 a.m. or after 9 p.m., the two outer edges of the cross on the northern cube will never cast shadows on the east and west cubes, and so no divisions are needed on the north faces of these cubes.

In order that anyone wishing to tell the exact time may do so with the minimum of trouble, the dial carries on its upper surface a statement giving the position of Kew and directions for adding or subtracting a certain number of minutes to or from the time indicated by the dial to obtain Greenwich mean time, or, when it is in force, "Summer Time." This information is contained in a table of 88 entries, calculated from the equation of time of 1930 (a year half-way between two leap years) for each day, to which the time corresponding to the longitude of Kew has been (algebraically) added. Any member of the public with this in sight can then, by making the correction for the actual date to the time shown by the sun, discover Greenwich mean time. The table is true throughout to the nearest half-minute.

On the sloping face facing south the following inscription has been engraved:—

"This Dial, designed, constructed, and erected by C. V. Boys, F.R.S., was presented by him to the Royal Botanic Gardens, Kew. Engraved by H. Routledge. The stone column, taken from Old Kew Bridge, was presented by George Hubbard, F.S.A., the capital and base were supplied by H.M. Office of Works. A. W. Hill, F.R.S., Director, 1929."

In a letter to the "Times" on December 3rd, with reference to the dial, Professor Boys writes:—

"In order to obtain a degree of accuracy of construction not generally, if ever, found in sundials, I made the Kew dial of five cubes screwed together with internal screws and all so completely locked that the parts cannot be unscrewed either severally or as a group, and the locking means can neither be discovered by inspection nor would they be revealed by an X-ray photograph.

I had one other object in mind, which was to remove the slur from which sundials have been allowed to suffer, partly from their often slovenly construction, but more often from the futile way in which they are so often planted, and finally, from the absence on the spot of the means of finding the two corrections to observations made on a correct dial in order to find Greenwich mean time. The public do not carry tables of equation of time, and they probably do not know the longitude, and without these the time shown may be more than a quarter of an hour wrong; but with the combined correction to the nearest half-minute for every day of the year in plain figures on the face of the dial anyone may find the time to the nearest minute, which may, in spite of all our wireless time signals, be very useful, at least as long as our watches are liable to be a minute or more wrong."

PRESENTATION OF STATUE.—Mr. A. T. Hare, of St. Margarets-on-Thames, has presented the bronze statue "Out in the Fields," by Arthur G. Atkinson, which was exhibited at the Royal Academy in the year 1890. The statue has been erected by H.M. Office of Works in the centre of the Iris Garden.

BIRDS.—During the past year several broods of geese have been reared, including Bar-headed and Magellans. Both the black-necked Swans, which were thought to be a pair, made nests and laid eggs; the Zoological Society have now very kindly sent us a male swan. The Society also presented a Snow gander to pair with our solitary goose. Additions to the collection of water fowl include a pair of Redbill Tree Ducks and a South African Pintail, which have not been represented before in our collections; two pairs of Carolinas and a pair of Mandarins, a pair of Common Teal, and a pair of Spotbills. Magellan and Bar-headed geese were presented to the Zoological Society and to the Royal Parks.

EXPERIMENTAL PLANTATION IN RICHMOND PARK.—In May, 1926, a number of trees and shrubs, chiefly from Southern Europe and New Zealand, were planted with the object of comparing their behaviour as to hardiness with those grown in the Gardens (*K.B.* 1927, Appendix I, p. 14). The atmospheric conditions obtaining in Richmond Park and in the Gardens are very similar, but it was thought when the plantation was made that, by reason of its higher elevation, the plants put out there might escape the injury attendant upon the late frosts which are experienced at Kew during April and May. Meteorological observations were made and compared with those taken at Kew for a considerable period, but the differences were not very marked, and, as most of the plants were killed by the severe spring frosts of 1929, which were so disastrous in the Gardens, it was decided to discontinue the experiment.



# RAINFALL RECORD.

Rainfall recorded at the Royal Botanic Gardens, Kew, during 1929.

Inches.				Inches.			
January	...	...	0·96	July	...	...	2·89
February	...	...	0·39	August	...	...	2·19
March	...	...	0·03	September	...	...	0·21
April	...	...	1·08	October	...	...	2·82
May	...	...	1·19	November	...	...	4·81
June	...	...	1·11	December	...	...	4·03

Total 21·71 inches.

The total for 1928 was 26·44 inches.

CONTRIBUTIONS TO THE GARDENS, 1929.—The most striking presentation during the year was the collection of Cacti generously given by Mrs. A. Sherman Hoyt, of Pasadena, California; full details are contained in Kew Bulletin No. 7, 1928, p. 239. Through the kindness of Mr. T. Hay, M.V.O., Superintendent of Hyde Park, Kew has received a large number of plants and seeds of interest, many of which were collected in Nepal. Several correspondents in Australia and New Zealand have sent supplies of seeds collected in their respective countries. We are again indebted to Major Lionel de Rothschild, and the Hon. Vicary Gibbs, particularly for collections of trees and shrubs.

During the year 909 separate consignments of living plants, seeds, etc., were contributed to the Gardens. The more important donations were as follows :—

## Private Donors :—

Mr. E. Ashby, Blackwood, South Australia.—41 packets of seeds.  
Mr. Shirley C. Atchley, British Legation, Athens.—Bulbs and corms of *Narcissus*, *Cyclamen*, *Anemone* spp., etc.

Mr. G. P. Baker, Sevenoaks.—Plants and seeds, including *Arnebia echinoides*.

Messrs. Bakers, Codsall, Wolverhampton.—A collection of seeds of New Zealand plants, and plants of *Rhodohypoxis Bauri*.

Mr. F. R. S. Balfour, Dawyck.—Cuttings of *Alnus incana fastigiata*, and miscellaneous seeds.

Messrs. Barr & Sons, Covent Garden.—Seeds and plants, including *Cyclamen cilicicum*.

Mr. A. C. Bartholomew, Reading.—25 packets of seeds of alpine and herbaceous plants.

Mr. A. Beer, Innsbruck, Austrian Tyrol.—Plants of *Juniperus communis* with parasite *Arceuthobium oxycedri*, and *Pinus Cembra* with parasite *Viscum album*.

British Banana Co., Ltd., West Smithfield.—Rootstocks of South American Bananas.

Mr. N. E. Brown, Kew.—Cape succulents, including *Monadenium Lugardae*.

- Mr. H. Bruins-Lich, St. Helena.—Bulbs and seeds, including *Watsonia* spp. and *Pelargonium Cotyledonis*.
- Mr. A. K. Bulley, Neston.—20 packets of seeds of Alpines.
- Messrs. Burkwood & Skipwith, Kingston-on-Thames.—Plant of *Osmarea Burkwoodii*.
- Mr. H. Campbell, Kyrenia, Cyprus.—Seeds of *Quercus alnifolia*, etc.
- Mr. W. N. Campbell, Pasadena, California.—Seeds, including *Lyonothamnus floribundus* var. *asplenifolius*.
- Mr. G. J. Carpenter, Dover.—Seeds of *Drosophyllum lusitanicum*.
- Messrs. James Carter & Co., Raynes Park.—A collection of seeds of herbaceous plants.
- Mr. G. Catt, Siquirres, Costa Rica.—A collection of seeds.
- Dr. T. F. Chipp, Kew.—A collection of seeds from Southern Sudan.
- Dr. R. Ciferri, Moca, Dominican Republic.—Seeds of *Sicana* sp. nov.
- Lt.-Col. Stephenson Clarke, Haywards Heath.—A collection of Rhododendrons.
- Dr. L. Cockayne, Wellington, New Zealand.—A collection of seeds of New Zealand plants.
- Sir Jeremiah Colman, Bart., Gatton Park.—Collection of orchids from British Honduras.
- Mr. H. F. Comber, Garlieston, Wigtownshire.—Alpines.
- Mr. H. Correvon, Geneva.—82 packets of seeds.
- Mr. A. D. Cotton, Kew.—Plants of *Senecio* spp. from East Africa and *Huernia Gardneri*.
- Mr. W. Cradwick, Mandeville, Jamaica.—Plants and seeds, and a collection of orchids, including *Angraecum* sp., *Oncidium pulchellum*, etc.
- Mr. V. C. Davies, New Plymouth, New Zealand.—Seeds of *Ixerba brexoides*.
- Messrs. Dobbie & Co., Edinburgh.—Seeds, *Lilium Sargentiae*, and a collection of new roses.
- Major H. Dodds, Palermo.—Seeds of *Rhus Coriaria*.
- Mr. James Douglas, Great Bookham.—Border carnations.
- Messrs. Clarence Elliott, Ltd, Stevenage.—Alpines and *Oxalis gigantea*.
- Messrs. Engelmann, Ltd., Saffron Walden.—Border and greenhouse carnations.
- Messrs. Fisher, Son & Sibray, Sheffield.—A collection of hardy trees and shrubs.
- Mr. R. C. Bruce Gardner, Northwood, Middlesex.—Seeds of *Quercus* spp.
- Mr. C. S. Garnett, Derby.—A collection of orchids.
- Hon. Vicary Gibbs, Elstree.—Hardy trees and shrubs.
- Mr. A. V. Giblin, Hobart, Tasmania.—A collection of Tasmanian plants, and miscellaneous seeds.
- Mr. B. Gilliat-Smith, Persia.—169 packets of seeds from Tabriz.



- Dr. M. Grabham, Madeira.—Stove plants and seeds of *Sida sessiliflora*.
- Mr. A. Grove, London.—Seeds of *Lilium Bolanderi*.
- Dr. Giuseppi, Felixstowe.—Herbaceous and alpine plants, seeds and bulbs.
- Mr. W. F. Gullick, Salisbury.—Bulbs of *Lilium Bakerianum* and *L. nepalense*.
- Mr. Cecil Hanbury, M.P., La Mortola, Ventimiglia, Italy.—Miscellaneous seeds.
- Professor A. Henry, Dublin.—Seeds and plants of hardy trees, also seeds of *Widdringtonia* spp., *Podocarpus elongatus*, etc.
- Miss A. E. Hill, Groendoorn, S.W. Africa.—20 packets of seeds; miscellaneous bulbs and succulents.
- Dr. A. W. Hill, Kew.—Seeds of *Geranium* sp. from Tasmania; *Gaultheria* spp., cuttings of *Salix* spp. (from Sweden), also seeds of *Arctostaphylos alpina*.
- Messrs. Hillier & Sons, Winchester.—Hardy trees and shrubs.
- Mr. C. W. von Hirschberg, Elizabethville, Belgian Congo.—Seeds of *Amorphophallus Eichleri*, etc.; plants of *Habenaria Lugardii*, and a collection of bulbs.
- Mr. H. M. Holloway, Kew.—56 packets of seeds of South African plants.
- Mr. F. N. Howes, Kew.—Plants of *Cyathea Dregei*; corms of *Richardia* spp.; bulbs of *Ixia* sp., and seeds of *Cussonia spicata*, *Anemone Fanninii*, etc.
- Mrs. Sherman Hoyt, California.—A collection of Cacti.
- Mr. S. B. Hutton, Pemberton, New Jersey.—Plants and scions of *Gordonia Altamaha*.
- Capt. Collingwood Ingram, Benenden, Kent.—Seeds, including *Araucaria* sp., *Rhododendron* spp., and plants of Japanese *Prunus*.
- Major L. Johnston, Campden, Glos.—Seeds collected on Mount Kilimanjaro, and plants, including *Olearia chathamica*.
- Mrs. L. Kemp, Waterloo, Sierra Leone.—Tubers of *Amorphophallus leonensis*.
- Dr. A. F. G. Kerr, Bangkok, Siam.—Fruits and seeds of *Diospyros* sp., and economic plants.
- Mr. C. E. Lane-Poole, Canberra, Australia.—Seeds of *Hardenbergia Sarsaparilla*.
- Mr. A. E. Lawrance, Venezuela.—Miscellaneous orchids.
- Sir Wm. Lawrence, Bart., Burford.—Seeds and plants, including *Hibbertia volubilis*.
- Mr. H. Lawton, Wellington, New Zealand.—Plants of *Celmisia* spp., and numerous seeds, including *Chordospartium Stevensonii*, *Notospartium torulosum*, etc.
- Mr. G. W. E. Loder, Ardingly, Sussex.—Seeds of *Gaultheria antipoda*, *G. perplexa*, and half-hardy shrubs.
- Mr. T. Ashton Lofthouse, Middlesbrough.—23 packets of seeds from Spain.

- Dr. J. P. Lotsy, Velp, Holland.—Cuttings of *Salix Caprea* var. *pendula*.
- Lady Manners, Christchurch, Hampshire.—Seeds collected in India, including *Rosa* sp.
- Mr. E. M. Marsden-Jones, Devizes, Wilts.—Seeds of herbaceous plants.
- Mrs. R. Mayne, Kodaikanal, S. India.—Bulbs of hybrid Liliiums.
- Mr. F. W. Millard, Felbridge, East Grinstead.—Alpines.
- Lady Milner, London.—Bulbs of *Brunsvigia gigantea*.
- Mr. H. Armytage Moore, Saintfield, Co. Down.—Hardy trees and shrubs, including *Nothofagus Solandri*.
- Mr. C. Musgrave, Hascombe Place, Godalming.—Plants of *Primula serratifolia*, *P. imperialis*, and *Meconopsis nepalensis*.
- Mr. O. H. Myers, Boxmoor.—Seeds and bulbs from Palestine.
- Hon. H. D. McLaren, Bodnant, N. Wales.—Seeds and plants, including *Primula chionantha*.
- The Orpington Nurseries, Orpington.—A collection of Irises.
- Mr. E. D. Page, Chelmsford, Essex.—Plants of *Orychophragmus violaceum*.
- Mrs. Parry, Lushai, Assam.—A collection of orchids.
- Sir John Ramsden, Bart., Bulstrode, Gerrard's Cross.—A collection of rhododendrons.
- Mr. G. Reuthe, Keston, Kent.—Miscellaneous seeds.
- Mr. G. W. Robinson, Harlesden.—64 packets of seeds collected in Chile.
- Rev. F. A. Rogers, Baghdad, Iraq.—Collections of bulbs from Baghdad.
- Major L. de Rothschild, Exbury, Southampton.—Hardy trees and shrubs, including *Lonicera Hemsleyana*.
- Dr. F. S. Russell, Marine Biological Station, Plymouth.—A collection of seeds from the Great Barrier Reef.
- Hon. Mrs. Ryder, Beaulieu.—Plants, including *Leucadendron plumosum*; bulbs and seeds from South Africa.
- Mr. H. C. Sampson, Kew.—Orchids and seeds.
- Messrs. Sanders, St. Albans.—Orchids, including *Cirrhopetalum spathulatum*, *Dendrobium Wardianum* and *Caladiums* in variety.
- Mr. T. Sharp, Westbury, Wilts.—Succulents, including *Ceropegia Rendallii* and *C. Haygarthii*.
- Mr. F. L. Skinner, Dropmore, Manitoba.—Seeds and bulbs, including *Lilium tenuifolium*.
- Mr. G. E. Stephens, Horsham, Sussex.—Exotic ferns.
- Major F. C. Stern, Goring-by-Sea, Sussex.—Seeds of New Zealand plants.
- Messrs. Sutton & Sons, Reading.—Seeds, and a collection of *Cyclamen* in 14 varieties.
- Lt. Col. E. E. Todd, Gibraltar.—Seeds of *Wilkesia Grayana*, *Viola arborescens*, and bulbs of *Narcissus niveus*.
- Messrs. Vilmorin-Andrieux et Cie., Paris.—Miscellaneous seeds.



- Messrs. R. Wallace & Co., Ltd., Tunbridge Wells.—Bulbs and seeds, including *Fritillaria Karadaghensis*.
- Mr. F. Walker, Launceston, Tasmania.—Seeds of *Telopea truncata* and *T. spicata*.
- Major General H. D. O. Ward, London.—A collection of orchids, bulbs and seeds from Kashmir.
- Major W. F. Ward, Kenya.—Tubers of *Gloriosa* sp.
- Mr. J. C. Watt, Aberdeen.—Seeds and plants, including *Primula Calderiana*.
- Mr. A. Wilkinson, Nelson, New Zealand.—47 packets of seeds.
- Mr. J. C. Williams, Caerhays Castle, Cornwall.—Plants and seeds, including *Gordonia Altamaha*.
- Miss Wilman, Kimberley.—Bulbs and Cape succulents.
- Mr. T. C. Wollaston, Adelaide.—Seeds, including *Banksia grandis*.
- Mr. A. Worsley, Isleworth.—Plants, grafts and miscellaneous bulbs.
- Mr. K. Yashiroda, Kagawaken, Japan.—Plants of *Chrysanthemum ornatum* and *C. morifolium*; bulbs of *Lycoris radiata*, and numerous packets of seeds, including *Lilium* spp. and *Rhus* spp.

Large collections of bulbs, seeds and plants were received from Dr. J. M. Cowan and Mr. J. Hutchinson as a result of their journeys in Persia and South Africa respectively.

#### *Public Institutions :—*

- Aberdeen, Cruickshank Botanic Garden.—*Liparis Craibiana*, and new Siamese introductions.
- Adelaide Botanic Gardens, South Australia.—Miscellaneous seeds.
- Amani, East African Agricultural Research Station.—Seeds and miscellaneous plants.
- Arnold Arboretum, U.S.A.—Seeds of hardy trees and shrubs.
- Bermuda, Department of Agriculture.—Seeds, spores, and bulbs of *Lilium longiflorum* var. *eximium*.
- Bucharest Botanic Gardens, Roumania.—44 packets of seeds.
- Buitenzorg Botanic Gardens, Java.—Seeds of economic plants and *Primula imperialis*.
- Calcutta Botanic Gardens.—Seeds of *Euryale ferox*, *Rosa macrocarpa*, etc.
- Chelsea Physic Garden.—60 packets of seeds of herbaceous plants.
- Copenhagen Botanic Gardens, Denmark.—Plants and seeds.
- Dahlem Botanic Garden, Berlin.—43 packets of seeds.
- Darjeeling, Lloyd Botanic Gardens.—112 packets of seeds, including many collected in Tibet.
- Dehra Dun, Forest Research Institute.—Miscellaneous seeds.
- Dominica, Department of Agriculture.—*Lissochilus* sp., *Cyathea* spp.
- Dunedin Public Gardens, New Zealand.—252 packets of seeds, and a collection of New Zealand native plants.

- Eddy Tree Breeding Station, California.—A collection of seeds of *Pinus* spp.
- Edinburgh, Royal Botanic Garden.—295 packets of seeds, and miscellaneous plants.
- Glasnevin Botanic Gardens, Dublin.—40 packets of seeds, and plants of exotic ferns.
- Hyde Park (per Mr. T. Hay, Superintendent).—204 packets of seeds, including many collected in Nepal; herbaceous and decorative plants, including *Lilium princeps*, *Lisianthus Russellianus*, *Meconopsis* and *Primula* spp.
- Imperial Institute, South Kensington.—Plants of *Euphorbia piscatoria* and *E. balsamifera*.
- Jamaica, Department of Agriculture.—A collection of Tree Ferns.
- Jassy Botanic Garden, Roumania.—99 packets of seeds.
- John Innes Horticultural Institution, Merton.—Plants, seeds and cuttings, including stove and greenhouse subjects.
- Kirstenbosch, S. Africa, National Botanic Garden.—A large collection of South African plants and seeds.
- Kuala Lumpur, F.M.S., Department of Agriculture.—Suckers of varieties of *Musa*, and seeds of other economic plants.
- Leningrad Botanic Garden, U.S.S.R.—59 packets of seeds.
- Lisbon Botanic Garden, Portugal.—81 packets of seeds.
- Marsh Botanic Gardens, Yale University.—A collection of seeds.
- Montpellier Botanic Garden, France.—225 packets of seeds.
- Nancy Botanic Garden, France.—41 packets of seeds.
- Ottawa, Central Experimental Farm.—Miscellaneous seeds, including *Zizania aquatica*.
- Oxford Botanic Garden.—Plants of *Epidendrum Brassavolae*.
- Pamaribo, Surinam, Department of Agriculture.—Plants of commercial varieties of *Theobroma Cacao*.
- Paris, Museum d'Histoire naturelle.—77 packets of seeds.
- Penang Botanic Gardens.—A collection of economic plants, orchids, etc.
- Peradeniya, Ceylon, Department of Agriculture.—A large collection of economic plants and ferns.
- Pretoria, Department of Agriculture.—Seeds, including *Erythrina acanthocarpa*.
- Pruhonice, Czechoslovakia, Dendrological Society.—Seeds and cuttings of hardy trees and shrubs.
- The National Rose Society, Westminster.—A collection of 41 species and varieties of *Rosa*.
- Rouen Botanic Garden, France.—55 packets of seeds.
- Simla, Viceregal Gardens.—Seeds of *Lilium* spp., *Gynandropsis speciosa*, etc., and bulbs of *Lilium Thomsonianum*.
- Singapore Botanic Gardens.—Seeds and plants.
- Sydney Botanic Gardens, N.S.W.—24 packets of seeds.
- Tiflis Botanic Gardens, U.S.S.R.—46 packets of seeds.
- Trinidad, Botanic Gardens.—A collection of economic plants, orchids, etc.



United States Department of Agriculture, Washington.—Seeds and plants, including *Juglans cinerea*. *Posoqueria latifolia*, economic plants and hardy trees and shrubs.

Wisley, Royal Horticultural Society's Gardens.—32 packets of seeds of herbaceous and alpine plants.

DISTRIBUTION OF PLANTS AND SEEDS.—Following the circulation of the 1928 seed list, 170 consignments of seeds were sent out from Kew in the early part of the year, the total number of packets thus distributed being 9,736 ; hardy trees and shrubs, 3,415 ; herbaceous plants, 6,321.

The most important seeds specially distributed included :—*Juglans* spp., *Caesalpinia brevifolia*, *Sorghum* spp., *Schinopsis Balansae*, *Acacia* spp., *Arachis hypogaea*, *Aleurites Fordii* and *A. montana*, *Sapium sebiferum*, *Voandzeia subterranea*, and Turkish tobacco.

Wardian cases of plants were despatched to the Botanic Gardens, Hobart, Tasmania ; also to the Departments of Agriculture of the Federated Malay States and Bermuda. Other overseas consignments were sent to the Superintendent, Frasers Hill, Federated Malay States ; Director, Department of Agriculture, Trinidad ; Director of Agriculture, Tanganyika Territory ; Director of Forestry, State Forest Service, Wellington, New Zealand ; and the Director of Agriculture, Cyprus. In addition to the foregoing, consignments of plants, which had been sent to Kew from various parts of the Empire for re-packing and re-forwarding, were despatched to the East African Agricultural Research Station, Amani ; Lady Storrs, Cyprus ; and the Director of Agriculture, Northern Provinces, Nigeria.

Other recipients of plants, etc., from Kew, included the following :—

Sir F. D. Acland, Killerton, Exeter.—Herbaceous plants and rhododendrons.

Prince Mohamed Aly, Cairo.—Plants of *Agave* spp. and fruits of *Rosa* spp.

Mr. H. G. Bell, Coulburn, New South Wales.—Cuttings of *Populus* and *Salix* spp.

Berlin-Dahlem, Kaiser Wilhelm Institut für Biologie.—Seeds and bulbs.

Cambridge, Botanic Garden.—Seeds, greenhouse and stove plants, trees and shrubs.

Mr. H. Campbell, Cyprus.—Cuttings of *Populus* spp.

Cheshunt, Herts, Experimental and Research Station.—Plants and seeds.

Cracow, Poland, University Botanic Garden.—Cuttings of *Aesculus*, *Tilia* and *Ulmus* spp., etc.

Mr. W. Cradwick, Jamaica.—Orchids and fuchsias.

Dewsbury, Parks Department.—Collection of economic plants.

- Monsieur L. A. Dode, Paris.—Grafts of *Aphananthe aspera* and *Maackia amurensis* var. *Buergeri*, etc.
- Messrs. Donard Nursery Co., Newcastle, Co. Down.—Plants, cuttings and seeds.
- Trinity College Botanic Garden, Dublin.—Collection of stove and greenhouse plants.
- Edinburgh, Royal Botanic Garden.—Plants and seeds.
- H.E. The Governor, Falkland Islands.—Seeds, including *Caragana arborescens* and *Cupressus macrocarpa* var. *guadalupensis*.
- Fisheries Research Station, Alresford.—Trees and shrubs.
- Hon. Vicary Gibbs, Aldenham.—Plants, seeds and cuttings.
- Giessen, Germany, Botanic Gardens.—Plants and cuttings.
- Glasnevin Botanic Gardens, Dublin.—Plants and seeds.
- Director of the Public Parks, The Hague, Holland.—Grafts of *Crataegus*, *Fraxinus*, *Ulmus* spp., etc.
- Mr. A. J. Hamilton Harding, Agra Patnas, Ceylon.—Acorns of 6 species of *Quercus*.
- Messrs. Hillier & Sons, Winchester.—Plants, seeds and cuttings.
- Captain Collingwood Ingram, Benenden, Kent.—Plants, including *Stewartia Malachodendron*, *Amelanchier stolonifera*, and species of *Rhododendron* and *Prunus*; also seeds.
- John Innes Horticultural Institution, Merton.—Seeds, greenhouse plants and shrubs.
- Rt. Hon. Viscount Lascelles, Knaresborough.—Seeds of *Lilium regale*.
- Sir William Lawrence, Bart., Burford.—Greenhouse plants.
- London County Council, Parks Department.—Plants and seeds.
- Messrs. Stuart Low & Co., Enfield.—Plants, seeds and cuttings.
- Middlesex County Council.—Plants of *Forsythia intermedia* var. *spectabilis*.
- Sir Frederick W. Moore, Willbrook House, Rathfarnham.—Trees and shrubs.
- Munich, Bavaria, Botanic Garden.—Seeds of *Typhonodorum Lindleyanum*.
- Oxford Botanic Garden.—Seeds and tubers.
- Paris, Museum d'Histoire naturelle.—Collection of ferns.
- Peradeniya, Ceylon, Royal Botanic Gardens.—Tubers of *Nymphaea* spp.
- Reading University, Horticultural Department.—Grafts of *Prunus* and *Pyrus* spp.
- Richmond Central School, Surrey.—Collection of trees and shrubs.
- Major L. de Rothschild, Exbury.—Tubers of *Nymphaea* spp., plants and seeds.
- Hon. Mrs. Ryder, Beaulieu.—Bulbs, seeds and plants.
- Dr. Sun Yat Sen's Mausoleum and Memorial Park, Nanking, China.—Seedling oaks and birches, also 101 packets of seeds.
- Mr. W. C. Slocock, Goldsworthy Old Nursery, Woking.—Plants, seeds and grafts.

Major A. A. Dorrien-Smith, D.S.O., Tresco Abbey, Isles of Scilly.—Greenhouse plants.

Stockholm, Sweden, Botanic Garden.—Plants of *Rhododendron* spp.; seeds of *Lysichitum camtschatcense* and *Typhonodorum Lindleyanum*.

Messrs. Sutton & Sons, Reading.—Plants, seeds and cuttings.

United States Department of Agriculture.—Seeds of *Pistacia integerrima*.

Upsala, Sweden, Botanic Garden.—Seeds of *Xanthoceras sorbifolia*.

Utrecht, Holland, Botanic Garden.—Plant of *Drosera dichotoma*.

Messrs. R. Wallace & Co., Ltd., Tunbridge Wells.—Seeds, plants and cuttings.

Mr. A. Worsley, Isleworth. —Plants, including *Strelitzia reginae*, *Cereus* spp. and *Amaryllis Belladonna* vars.

Mr. K. Yashiroda, Kagawaken, Japan. —Seeds of South African Heaths.

The usual distribution of surplus trees, shrubs and herbaceous plants to educational and public institutions was made in March.

### National Pinetum at Bedgebury.

Despite the long and cold winter of 1928-29, and the abnormally dry summer of 1929, the year, taken all round, was the most favourable there has been for the growth of young trees since work was commenced in 1925. The long winter retarded growth in early spring until the danger of late frosts was over, therefore uninterrupted growth was possible. Moreover injury from pine weevils was very slight compared with previous years, and early spraying kept green fly on spruce, which was very troublesome from 1926 to 1928, in check. This combination of circumstances resulted in the recovery of a number of plants that had been injured by frost and insects in previous years. Some plants, however, that were injured during those years will have to be replaced.

A few plants of *Cupressus* have been killed by honey fungus (*Armillaria mellea*), which is very prevalent on old stumps.

Although during summer all the streams and most of the springs dried up, none of the plants actually suffered from want of water. The policy of preparing large holes for the plants, with the hard pan beneath the surface soil thoroughly broken up, has been fully justified as it has resulted in the roots being able to penetrate into moist subsoil. Many of the young trees have made very good growth, and some interesting data should become available at the first quinquennial general measurement, which is timed to take place during 1930.

A new approach to the Pinetum, 60 feet wide, has been made across the bottom of the meadow near Marshall's Lake. In order to compensate the farmer, whose farm includes this meadow, for the loss of a drinking place for cattle, a zinc trough has been provided with a pipe line to carry water from the well on the hill near the



Pine Avenue. The new approach has been bordered with deciduous cypress and a mass of the same tree has been formed on the mud bank in Marshall's Lake.

The opportunity was taken during the summer drought of opening out a number of silted-up drains in the vicinity of Marshall's Lake and of carrying out other drainage work. Sixty *Rhododendrons* from the Temperate House Pits were planted in November.

A number of people interested in the *Coniferae* have visited the Pinetum during the year and expressed their pleasure at the appearance of the young trees. As funds are not available for the provision of smooth avenues and paths, visitors should be on the look out for old tree butts, holes and other inequalities in the ground, many of which are unavoidably present. As opportunity offers the worst of the obstructions are being removed and holes filled, but progress is necessarily slow.

Unfortunately several old trees were blown down and others injured during the December gales.

### The Museums.

GENERAL.—The increasing interest taken in the economic products of plants that has been noticeable for some years, continued during 1929, and a good deal of time was spent in correspondence and in discussing home and colonial products with visitors. Many of the questions that arose related to well-known crops and the identification of specimens, but there were others of a more troublesome character, particularly those that referred to finding new markets for well-known crops, and the suggestion of new crops for farmers in the colonies and at home that would be likely to pay better than those already grown. The difficulty in answering such questions is often intensified by the writers of newspaper articles allowing the spirit of optimism to outrun discretion.

The incorporation of new specimens in the Museums made a good deal of work, for in the congested state of the collections additions can only be made by extensive re-arrangement or by the removal of old specimens. In some instances the exchange of new for old can be effected without difficulty, but where Museum specimens are complementary to others in the Herbarium, the old ones must be retained. The ideal means of dealing with such specimens would be to consign them to a special room or building where they could be examined when necessary, but where they would not interfere with the proper display of more important commercial products.

Attention to labels has provided constant work. This appears to become heavier year by year, partly by discoloration of old labels and partly through the necessity of keeping names up to date in accordance with the findings of research in nomenclature.

A good deal of the preparatory work for a new Guide to Museum No. I has been done, and it is hoped that the Guide will be published

during 1930. An Assistant has devoted part of his time to the collection of information relating to plants used in various parts of the world as native fish poisons, and material of many of these plants has been procured and despatched to the Department of Insecticides and Fungicides at Rothamsted, where experiments were conducted with a view to finding out their approximate value as insecticides.

The Keeper has continued to act as Executive Officer for the Pinetum at Bedgebury, and has attended to various questions on Silviculture addressed to the Gardens.

Very good use was made of the Museums during the spring and summer months by various London schools. Large numbers of children were brought by their teachers and showed considerable interest in the exhibits. Such parties are usually well behaved, but there are some children unfortunately who are unable to resist the temptation to tear or otherwise destroy card labels.

MAINTENANCE.—H.M. Office of Works have redecorated part of Museum No. II, and the repainting of the insides of the cases in that building, commenced in 1927, has been continued. A new roof of copper has been placed on the North Gallery to replace the original zinc roof, which, during the last few years, has been a source of considerable trouble owing to cracks.

PRESENTATIONS TO MUSEUMS.—Director of Field and Animal Husbandry, Union Buildings, Pretoria.—Three samples of S. African grain Sorghums, grades K.A, K.2, K.3.

Mr. S. Lister James, British Honduras.—Specimens of Pita Fibre.

Director, Department of Agriculture, Uganda.—Specimens of varieties of *Eleusine coracana* as cultivated in Uganda.

Messrs. Pinnock Bros., 30, Mark Lane, London, E.C.2.—Sample of Powdered Lucerne.

Mr. F. N. Howes, Royal Botanic Gardens, Kew.—Thirty specimens of S. African woods.

Mr. A. Bruce Jackson.—Cones of *Pinus Thunbergii*, and seeds of *Cedrus brevifolia*, *Quercus alnifolia*, *Juniperus phoenicea*.

Dr. Youngman, Economic Botanist, Central Provinces, India.—Fruits of *Arachis nambyquarae* and *Acacia arabica*.

Mr. J. D. Kelly, Information Branch, Anglo-Persian Oil Co. Ltd., Britannic House, Finsbury Circus, London, E.C.2.—Prints of photographs of Tamarisk trees taken on the coastal plain near Ganaweh, S. Persia.

Dr. Dalziel, Herbarium, Kew.—Sample of *Psyllium* seeds and twigs and roots of *Cryptolepis triangularis*.

Mr. J. Rochford, Coggeshall, Essex.—Two sheets of illustrations of grasses.

Mr. W. H. Fairbairns, "Marston," Aldenham Avenue, Radlett, Herts.—Walking stick of Purple Heart (*Peltogyne porphyrocardia*).

Mr. A. A. Kennedy, Technical Director, International Icilma Trading Co. Ltd., 37-45, King's Road, St. Pancras.—Sample of Mawah Oil.

Mr. F. C. Deighton, Agricultural Department, Sierra Leone.—Sample of "Pa-Kamlo Rice."

Mr. E. I. Nisbett, Agricultural Department, Sierra Leone.—Seeds of *Drypetes Afzelii*.

Dr. Kerr, Bangkok, Siam.—Sample of "Kalampak," a medicinal wood sold in Bangkok; specimen of Som Mû (Fingered Lemon) used as smelling salts, prepared in Bangkok.

Dr. A. C. Thaysen, Bacteriological Laboratory, R.N. Cordite Factory, Holton Heath, Dorset.—Table napkins made from Ramie fibre.

Major Du Plat-Taylor, 36, Victoria Street, Westminster, S.W.1.—Section of Greenheart timber riddled by seaworms, *Limnoria* and *Teredo*, from Swanage.

Mr. G. Soames, Sheffield Park, Uckfield.—Transverse section of trunk of *Ailanthus glandulosa*.

Mr. E. B. Eckbo, Forest Department, Union of S. Africa.—Fourteen specimens of S. African woods.

Messrs. Lever Bros. Ltd., Port Sunlight, Cheshire.—Twenty-three specimens of West African Oil Palm and Coconut products, to replace old exhibits.

Messrs. Pitales Ltd., 9-11, Fenchurch Street, London, E.C.3.—Eleven specimens of Pita fibre in an unmanufactured and manufactured state.

Surgeon-Colonel A. W. Sinclair, "Edina," Chipping Sodbury, Gloucestershire.—Writing desk made of wood of Kayu-Rengas, (*Melanorrhoea* or *Gluta* sp.).

Messrs. Fortnum and Mason, Ltd., 182, Piccadilly, London, W.—Ten jars of preserved vegetables to replace old exhibits.

Professor G. Stahel, Agricultural Experiment Station, Paramaribo, Surinam.—Two fruits of wild *Cacao*.

Mr. H. Clinton-Baker, Bayfordbury, Herts.—Distillate and extract from branches of *Davidia*, and a plank of *Quercus velutina*.

Director, Botanic Garden, Singapore.—Collection of Chinese Drugs, received through Mr. Burkill.

Mr. C. Moriondi, Pergolesi 19, Milan.—Samples of fibre of *Spartium junceum*, with thread and fabric manufactured from the same.

The Balsa Wood Company, 4, Great Queen Street, Kingsway, London.—Plank of Balsa Wood.

Miss J. Bostock, Monte Creek, B.C.—Twigs of Douglas Fir with deposits of sugar.

Messrs. Joseph Rogers and Sons, Ltd., 6, Norfolk Street, Sheffield.—Ten samples of wood used in making knife handles, also handles made from the same.



Director A. Löf, Stora Kopparbergs Bergslags Aktiebolag, Falun, Sweden.—Nine photographs illustrating charcoal-burning in Sweden.

Mr. R. S. Lynch, Dartington Hall Estate.—Twenty-three photographs of features on the Dartington estate.

Dr. Grabham.—Two spoons made of wood of *Clethra arborea* in Madeira.

Mrs. Collins, Sriracha, Siam.—Rice and rice-meal from Bangkok.

Conservator of Forests, Belize, British Honduras.—Pods and seeds of Wild Cacao, and pods, leaves and wood of "Cacaopaste."

Director, Imperial Institute.—Collection of 147 specimens of Colonial woods.

Director, Botanic Garden, Eala, Belgian Congo.—Fruits and seeds of *Sclerosperma Mannii*.

Mr. R. N. Parker, Forest Botanist, Dehra Dun. —Dried bark and leaves of *Albizzia stipulata*, *A. procera* and *Ougeinia dalbergioides*.

Perry's Hardy Plant Farm, Enfield.—Transverse section of the trunk of the old Cedar of Lebanon from Enfield Old Palace.

### The Jodrell Laboratory.

The microscopic structure of a large number of specimens was studied with the object of identifying them as far as possible by the help of their anatomical characters. The specimens examined were of varied nature, including samples of wood, fibres, bark and seeds. Among these were a collection of medicinal roots, etc., from Canada, used by native Indians; a series of ancient specimens (tubers, twigs, leaves, etc.), from the Badari district, Egypt; a number of samples of wood from North Borneo; splinters from two panels of pictures by Rembrandt, which were identified as wood of *Cedrela* sp.; pieces of wood received under the name of Nut Wood or Scented Wood, found to be *Convulvulus scoparius*, "Rose Root" of the Canary Islands, which contains an oil once used in perfumery; samples of Peruvian Mahogany, the identity of which was, for some time, uncertain, but appears to have been established (in 1928) as *Swietenia macrophylla*.

Dr. D. Hooper examined several specimens of Chinese drugs, both microscopically and by the application of chemical tests, for purposes of identification, the specimens belonging to the collection referred to in last year's report.

Mr. F. N. Howes was engaged in a study of the comparative anatomy of African *Rutaceae*, the sub-family *Toddalieceae* being dealt with chiefly during the current year.

Dr. S. Junell prepared material of the flower-buds of various species of *Loganiaceae* and *Labiatae* for cytological study, especially relating to the reduction division in the anthers.

Miss I. Manton prepared further material of the roots of a number of species of *Cruciferae*, for cytological work on the morphology of the chromosomes.

Dr. A. W. Ossowski carried out an investigation dealing with the character and chemical composition of the megaspore-membrane in several members of the *Coniferae* and in *Cycas*, and also studied the development and cell-contents of abnormal periderm-tissue in two species of *Khaya*.

Cultures of different *Fungi* were prepared and examined by members of the Herbarium Staff in connection with their Mycological work.

### The Herbarium.

The second part of the cabinet extension programme, namely, the provision of an extra tier of cabinets above the existing blocks on the ground and first floors, was completed in 1929 by the addition of a tier on the first floor of the west wing. This has temporarily relieved the congestion of the specimens in that part of the Herbarium and afforded a certain amount of room for expansion. The crowded state of the material on the second floors of both wings (comprising the Gamopetalae and part of the Apetalae) presents an increasingly serious problem, the shelves of such families as Rubiaceae, Apocynaceae, and Labiatae being filled to the limit of their capacity, so that the incorporation of fresh material belonging to these and other groups has had to be suspended until further accommodation can be provided. Nevertheless over 78,000 sheets were "laid in" during 1929, which constitutes a record, the previous maximum being 68,000 in 1927.

During the past year there has been a further increase in the activities of the Herbarium. International co-operation in research has been assisted by a large extension of the system of reciprocal loans between important botanical institutions. During the year, over 9000 specimens were received on loan, including 4000 required for the preparation of the Flora of Madras, and nearly 6000 specimens were sent out on loan to other institutions at home and abroad. A considerable amount of the material sent out consisted of partially-named specimens, which have been returned fully named and authenticated by specialists in the various groups concerned, so that the scientific value of the material has been greatly enhanced.

Consultation of the Orchidaceae in the Herbarium has been greatly facilitated by the re-arrangement of the genera according to Schlechter's "Das System der Orchidaceen."

Notices of publications embodying the results of research by members of the staff and visiting botanists are given below under their respective geographical headings. A paper on "The Herbal of Otto Brunfels" (Journ. Linn. Soc., Bot. xlviii. pp. 79-124), published in December, 1928, escaped mention in the Annual Review for that year. It consists of a scientific study of the Herbal in the light of modern knowledge, and includes identifications of the numerous plants figured.

*Routine.*—Work on the unmounted collections on hand has been very satisfactory. Over 20,000 sheets have been mounted, poisoned, and laid in. This figure includes recent collections which have been mounted shortly after receipt. In addition to the current year's mounting, nearly the whole of the arrears of specimens ready to lay in have been incorporated, and only a small number, mostly belonging to families for which no space is available, have not yet been placed in their proper covers in the Herbarium. This is a considerable achievement since it means that approximately 40,000 sheets from Europe and the Orient (in the sense of Boissier's *Flora Orientalis*) have been laid in during 1929.

As a consequence of the extra concentration on clearing the stores and the large numbers of plants received for determination fewer genera have been written up than usual. A great deal of work remains to be done in this direction before the collections are arranged in such a manner as to make consultation easy. The following genera have been written up during the year according to recent monographs or standard lists or floras; *Quercus* and other smaller genera of the *Cupuliferae*, *Clematis*, *Adonis*, *Anemone*, *Ranunculus*, and some small genera of the *Ranunculaceae*.

The distribution of plants for the Botanical Society and Exchange Club of the British Isles was undertaken from Kew. 4804 specimens were distributed under the supervision of Dr. W. B. Turrill, who also edited the Distributor's Report. As a result of calling attention, by this and other means, to the interest of Kew in the British flora, very valuable parcels of specimens were received for the Herbarium, notably from Mr. J. E. Little, Mr. P. M. Hall, and Dr. E. Drabble. It is hoped that all interested in the flora and vegetation of the British Isles will aid the efforts being made to complete the representation of the British flora in the Herbarium.

Additional valuable collections have also been received during the year from Albania, Thessaly, Thrace, Bulgaria, Yugoslavia and Spain, but the most important contributions have been from farther east, especially from Palestine, Iraq and Persia. The fine collections of Mr. Gilliat-Smith from Azerbidjan have been completed and an account of them has been prepared for publication.

During the autumn collections made by Dr. Cowan and Dr. C. D. Darlington in Persia were arranged and partly named. The work of identification is necessarily slow, since the literature is scattered and in some cases the species are not represented in the Kew Herbarium. Information as to the occurrence and distribution in Persia of various species of *Pyrethrum* was given to the Anglo-Persian Oil Company.

*Research and Publications.*—The following papers appeared:—  
Botanical Society and Exchange Club: Distributor's Report for 1928.



The Flora of Foula (Bot. Soc. & Exch. Club, 1928, vol. viii, part v. p. 838 : 1929).

Researches on *Silene maritima* and *S. vulgaris* : II-IV (*K.B.* 1929, pp. 33, 145, 197).

On the Flora of the Nearer East : IV. (*K.B.* 1929, p. 223).

Variations in Sex Expression in *Ranunculus* (*Nature*, cxxiii. p. 798).

Colour and Sex in *Ranunculus* (*Journ. Genetics*, xxi. p. 169).

Vegetation of the Rodope Mountains (*Journ. Ecol.* xviii. p. 409).

*Quercus stranjensis* Turritt (*Bull. Soc. Bot. Bulg.* ii. p. 61).

Modern Methods in Taxonomic Botany (*Bull. Soc. Bot. Bulg.* iii. p. 119).

## ASIA.

INDO-MALAYAN REGION.—*Routine*.—Mounting and laying in progressed satisfactorily. Practically all the Indian material has now been laid in, and only the most recent contributions remain to be incorporated. Some 20,000 sheets of Malay Islands and Philippine Islands specimens still remain in store awaiting accommodation in the general Herbarium, since lack of space prevents their incorporation.

Contributions to the herbarium were received from the Singapore Botanic Gardens ; the Imperial Forest Botanist, Dehra Dun ; the Forest Botanist, Burma ; and the Systematic Botanist, Ceylon.

About 800 specimens collected by Captain F. Kingdon Ward in the Abor and Mishmi Hills were presented during the year ; the majority of these remain to be determined.

Dean Elmer D. Merrill presented a set of Squire's collection made near Hue in Indo-China, the locality where Loureiro's types were found.

Further extensive collections of Siamese plants were received from Dr. A. F. G. Kerr, and are being determined by Prof. W. G. Craib.

Smaller contributions were received from Mrs. A. D. Parry (Cachar and Garo Hills, Assam) and Revd. W. J. L. Wenger (Lushai Hills, Assam). Dr. Gravely, Superintendent of the Madras Museum, sent two interesting collections (mainly of *Eriocaulon* and *Impatiens*), made by himself, Mr. E. Barnes and Mr. Mayuranathan, in the Nilgiri Hills of South India.

*Research and Publications*.—Progress was made with the preparation of the Flora of the Presidency of Madras.

A very interesting assemblage of about 400 sheets, sent by J. G. Koenig to A. J. Retzius in the last quarter of the 18th Century, was received on loan from the Botanical Museum at Lund. A number of these appear to be the original specimens on which were founded some of the species described by Retzius in his "*Observationes Botanicae*," published from 1779 to 1791. The collection was still under investigation at the close of the year.

The following papers appeared :—

"Contributions to the Flora of Siam," additamentum XXVI, by W. G. Craib, J. E. Dandy and E. T. Geddes (*K.B.* 1929, p. 105).

"Contributions to the Flora of Burma," parts VII. and VIII. (*K.B.* 1929, pp. 204, 310).

"Plants new to Assam," part I (*K.B.* 1929, p. 247).

"A new *Michelia* from the Borders of Tibet and Assam," by J. E. Dandy (*K.B.* 1929, p. 222).

"New species from the Malay Peninsula and Borneo," by H. N. Ridley (*K.B.* 1929, p. 254).

"Some interesting *Erias* from Burma" (*K.B.* 1929, p. 307).

"Notes on *Blastus Cogniauxii*" (*K.B.* 1929, p. 317).

CHINA AND NORTHERN ASIA. *Routine*.—Approximately 6600 sheets have been incorporated in the Herbarium this year, and the labels of several large collections have been written up from the lists concerned.

Perhaps the most important piece of work accomplished has been the urgently required rearrangement of a great many genera in accordance with monographs and revisions, mostly of recent date. In many cases critical determination has now been made possible in genera which previously contained such a high proportion of unnamed or incorrectly named material that accurate specific determination was impossible without a prohibitive expenditure of time. Though some 38 genera have been dealt with, much still remains to be done in this direction.

The naming of Abbé E. Licent's valuable collection from North China and Mongolia has been continued, and Capt. F. Kingdon Ward's Upper Burma (1926) collection is also in process of identification. Further instalments of the excellent set of exsiccata issued by the University of Central Asia (Tashkent) have been received and laid into the Herbarium. The critical notes on the labels accompanying the specimens from this comparatively poorly represented area are of great value to any worker studying the genera concerned.

Among the more important accessions to the Herbarium was a set of over 700 specimens from the province of Chekiang, received from the University of Nanking.

*Research and Publications*.—Owing to the kindness of Dr. E. D. Merrill and others, who sent numerous specimens of *Gentiana* and *Crawfordia* on loan, it has been possible to enlarge the revision of these genera referred to last year.

The investigation of the Asiatic herbaceous *Sambuci* referred to in last year's report has been continued, but publication has been delayed by pressure of other work. Great assistance was rendered by the loan of all the material of *Sambucus* from the Royal Botanic Garden, Edinburgh, which has been named and returned. The preparation of a paper on certain species of *Allium* has also been facilitated by the loan of all the Edinburgh material, the greater part of which has already been named.

A posthumous paper by the late Herr W. Becker, entitled " *Violae Asiaticae Novae*," was published in the *Kew Bulletin* for 1929, p. 200. An account of " The Botanical Collection made by Capt. F. Kingdon Ward in the Eastern Himalaya and Tibet in 1924-25 " appeared in *Journ. Linn. Soc., Bot.* xlviii. 149 (1929).

#### AFRICA.

Although all the old African collections in the Store have now been sorted and mounted, it has not been possible to make much progress with the work of determination, since the naming of current collections more than occupies the time of the available staff. The preparation of further Parts of the two African Floras also makes considerable demands on the time of the staff of this section. Part 5 of Volume IX of the Flora of Tropical Africa, dealing with the genera *Setaria*—*Melinis*, was sent to press in the autumn, and the preparation of a further Part dealing with the next section of the Gramineae is now in hand. Good progress has been made with Part iii of the Flora of West Tropical Africa.

The next in the series of the local African Floras it is hoped to prepare will be a Flora of East Tropical Africa, and efforts are being made to obtain as complete and as representative collections as possible from Uganda, Kenya, Tanganyika Territory, Nyasaland, Northern and Southern Rhodesia.

WEST TROPICAL AFRICA.—*Routine*.—Numerous collections were received from Sierra Leone (coll. F. C. Deighton and R. R. Glanville), Gold Coast (coll. C. Vigne and F. R. Irvine), Northern Nigeria (coll. H. V. Lely and A. S. Thornewill), Cameroons (coll. T. D. Maitland), and duplicate material from Liberia, Gold Coast and Nigeria was presented by the Imperial Forestry Institute, Oxford. Lists of determinations have been forwarded, and, as far as possible, these collections have been cited in the West African Flora. Further instalments of the very large collections made by Mr. G. Proctor Cooper on behalf of Mr. Firestone in Liberia were presented by Prof. S. J. Record of Yale University. A number of determinations of this collection has been supplied and distribution of the duplicate material has been made. Specimens of Sorghums from the various Departments of Agriculture, especially from Southern Nigeria (coll. Glendon Hill), have been received, which will be of great value in the systematic work on the genus which is being undertaken at Kew.

A considerable number of grasses was received for identification, especially from the Cameroons (coll. T. D. Maitland), and from the Gold Coast, including a set from Professor R. G. Linton in connection with research on the composition of grasses which is being undertaken by the Royal (Dick) Veterinary College, Edinburgh. In connection with the preparation of the West African Flora considerable revision of the Rubiaceae, which is represented in the area by over 400 species, was found necessary, and concurrently with



this revision a rearrangement of the herbarium material was carried out, which will greatly facilitate future work.

*Research and Publications.*—In the absence of Mr. J. Hutchinson in South Africa during the last five months of 1928 and the first four months of 1929, the work on the Flora of West Tropical Africa was delayed. It is expected, however, that Part iii, containing all the Metachlamydeae (Gamopetalae), will be ready for press by the end of June, 1930. In this connection the valuable monograph on the Vanguerieae by Dr. W. Robyns of Brussels, prepared mainly at Kew, has been of great service.

**NORTH-EAST AFRICA.**—Little material from this area was on hand in January, but several interesting collections were received during the year, notably a small series made by Mrs. E. Burne in British Somaliland, a set of over 300 specimens from the Anglo-Egyptian Sudan by Mr. N. Douglas Simpson, and Dr. T. F. Chipp's collection, the first from the Iratong Mountains, Southern Sudan. A collection made by Lady Maffey at Erkowit, Red Sea Hills, and one by Mr. R. A. Farquharson, the Director of Agriculture for British Somaliland, were also received and dealt with. A considerable proportion of these two collections consisted of grasses, which were augmented by a small but interesting set from Italian Somaliland, which was presented by Dr. Pampanini. Lists of determinations were sent in all cases. /

Reference should be made also to the Anglo-Italian Somaliland Boundary Commission, to which Mr. C. L. Collenette is attached from Kew as a botanist. Three instalments from him have come to hand and these will be dealt with as a whole when the remainder have been received.

*Research and Publications.*—A paper entitled "The Imatong Mountains, Sudan," based on the collection referred to above, was published in *Kew Bull.* 1929, pp. 177-197.

**EAST TROPICAL AFRICA.**—Large supplies of material have continued to come to hand from Uganda, Kenya, Tanganyika, and this year interesting collections have been received from Northern Rhodesia.

From Uganda about 900 specimens from various collectors were forwarded by Mr. L. C. C. Liebenberg, the Government Botanist at Kampala, for determination or corroboration. Several valuable collections of grasses, especially from the mountains in the south-west corner of the Protectorate, amounting in all to over 600 numbers, were received from Mr. J. D. Snowden. These contained not only several new species but also a new genus.

Kenya material was received mainly from Mr. H. M. Gardner, Conservator of Forests, and other members of the Forestry Department, and smaller collections were sent by Mr. J. MacDonald, Mycologist and Botanist, and several of the Agricultural Officers. Several novelties have been found in these collections. A particularly useful donation was a collection of duplicate grasses with

several co-types, which was presented by Dr. R. E. Fries of Stockholm.

From Tanganyika the most interesting collections have again been received from Mr. A. E. Haarer, who sent 300 specimens from the Moshi and Kilimanjaro districts, in which were included a new genus of grasses, and from Mr. P. J. Greenway of the East African Agricultural Research Station, Amani, who forwarded 850 plants, mostly in connection with the Flora of Zanzibar, on which he is engaged. Two other collections of Kilimanjaro plants were also received. From Nyasaland, Dr. J. Burt Davy of the Imperial Forestry Institute, Oxford, presented a valuable collection which he had made on Mt. Milanje, an area which had not been worked for nearly 40 years. A useful series of Sorghums and rices was received from Mr. F. Barker of the Department of Agriculture.

The Northern Rhodesian accessions were of special interest as this territory has been little explored botanically. A collection was received from Dr. Burt Davy from the Livingstone, Lusaka and Fort Jameson areas, and another and larger donation principally from the Lusaka district, containing a large number of grasses, was presented by Mrs. Cecil Sandwith. An extremely interesting collection, which contained many novelties, was presented by Miss J. M. Marks, from the Mwinilunga district, which had not been previously explored botanically. The determination of all these collections has been put in hand, but it has not been possible to supply more than partial lists of the names to the collectors.

Material was again forwarded from Southern Rhodesia by Mr. F. Eyles and Mr. R. G. N. Young, whilst contributions from the Belgian Congo and Mauritius were received from Messrs. W. Robyns and R. E. Vaughan respectively.

*Research and Publications.*—The following papers dealing with East African Grasses were published in the *Kew Bulletin*, 1929: "Snowdenia, A New Genus from Uganda" (pp. 28-31); "A New Genus of Grasses" (*Holcolemma*, pp. 244-247); "A New Genus from Tanganyika Territory" (*Heterocarpha*, pp. 263-265).

**SOUTH AFRICA.**—The largest accession from South Africa has been Mr. J. Hutchinson's collection made during his tour in the Union in 1928 and 1929 (see *K.B.* 1929, pp. 273-285). Over 3200 numbers were collected and there are usually 4 or 5 sheets of each. Two sets have been presented to Herbaria in South Africa. This collection is being mounted and named as time permits. Other collections received from South Africa include a set of critical Transvaal plants from Professor C. E. Moss, a useful series from the Cape Province presented by Commander T. N. Salter, and a small but interesting collection from the Limpopo District collected and presented by General J. C. Smuts.

The Assistant for South Africa has been engaged in naming collections received from the National Herbarium, Pretoria, the Herbarium of the Albany Museum, Grahamstown, the Witwatersrand

University Herbarium, Johannesburg, and the MacGregor Museum Herbarium, Kimberley, in addition to a small number from the Herbarium of the Natal Botanic Gardens. In many cases duplicates were presented to Kew. The total number of specimens named in this connection was about 2000, including a parcel of 500 sheets of *Senecio* on loan from the Delessert Herbarium at Geneva.

As an outcome of representations by Dr. I. B. Pole Evans, Chief of the Division of Plant Industry at Pretoria, made largely as a result of Mr. Hutchinson's visit, it has been arranged to present to the National Herbarium at Pretoria duplicate material of types and authentic specimens now in the Kew Herbarium. This will prove of great assistance to the botanical institutions in South Africa, as it will enable them and other botanists to deal with their own taxonomic problems and name their plants with certainty without such constant recourse to the Kew Herbarium. With this in view the whole of the Kew collections are being systematically examined, and where possible duplicate material is being extracted and sent to Pretoria. Such a transference could only be made to a Government Department which is engaged in responsible systematic research, and where it is felt that it is in the interests of science as well as in the interests of the Empire that such specimens may be distributed.

*Publications and Research.*—In connection with specimens submitted from Pretoria the revision of certain genera has been necessary, namely *Nuxia*, *Olea*, and the section *Pseudopachyrrhizus* of *Dolichos*. Papers on these subjects have been prepared for publication by the Assistant for South Africa; that on *Nuxia* has already appeared (*K.B.* 1, 1930).

The receipt from Johannesburg of some apparently undescribed species of *Senecio* led to the investigation of about 25 South African species in the light of type material from the Delessert and Upsala Herbaria. The result has been to effect a revised grouping of the species concerned, and the separation of a number apparently hitherto undescribed. Work on the Section *Paucifolii* of the "Flora Capensis," as referred to last year, has been continued (*Kew Bull.* App. 1, 1929, p. 33).

The preparation of the Flora of the Fauresmith Division, O.F.S., was also continued at intervals. A paper on the revision of the South African species of Vitaceae has been prepared. "Notes on African Grasses": IX and XI, dealing with "Some Saline-loving Grasses occurring in South Africa" (pp. 83-87), and "A New Genus of Grasses from Bechuanaland" (*Megaloprotachne*, pp. 319-322), were published in the *Kew Bulletin*, 1929.

The following papers on South African botany were published by Mr. N. E. Brown:—"The Iridaceae of Burmann's *Florae Capensis* Prodrumus": I and II (*K.B.* 1929, pp. 129 and 243), and "New Species of and Critical Notes on Mesembryanthemum and allied Genera" (*K.B.* 1929, p. 56).



## AMERICA.

*Routine.*—The work of mounting and incorporating material from the Store has continued satisfactorily throughout the year. About 8500 sheets have been mounted, and 10,500 laid in. The American material in the Herbarium has been greatly enriched by the inclusion of collections made by Ducke and Ule in Brazil, and by Cooper in Panama, as these contain a number of valuable type specimens. Numerous duplicates of Trinidad species, previously unrepresented, have been presented by Mr. R. O. Williams. A set of 80 Peruvian grasses has been presented by Dr. A. S. Hitchcock.

The most important accession during the year was the extensive botanical collection formed by the botanists of the Oxford University Expedition to British Guiana, 1929, comprising over 1600 numbers of Phanerogams and Cryptogams, and nearly 3000 sheets of the former alone. A special feature of the collection is the number of duplicates of the less known and larger forest trees, many of which have not up to the present been identified with certainty, owing to lack of material and accurate data. A brief note on the Expedition is given on pp. 4 and 5.

Among the more important collections which have been named may be mentioned some 400 specimens of Costa Rican plants collected by Mr. C. H. Lankester, 400 of Mr. W. Fishlock's plants from Dominica, nearly 500 sheets of the Amazonian collection made by Ule, 100 of M. Robert's Matto Grosso plants, the collection made in Canada by Prof. R. Ruggles Gates and Mr. K. Mellanby, and most of the West Greenland plants collected by the Oxford University Expedition in 1928. The work of naming the Lehmann collection was continued, several of the monocotyledonous families being dealt with, and more than 350 duplicates prepared for distribution.

The work of writing up genera in the Herbarium according to the latest floras and monographs has been continued, the following being among the more important genera which have been dealt with: West Indian species of *Ternstroemia*, South American species of *Heliotropium*, *Gentiana* and *Halenia*, and the genus *Zauschneria*.

Over 900 sheets of partially named West Tropical South American Rubiaceae have been determined by Dr. P. C. Standley, who has based new species on a number of the specimens, thus greatly increasing the scientific value of the material. Several hundred sheets of American species of *Bidens*, which had been on loan to Dr. E. E. Sherff, have been critically named and returned by him.

The work of the American section has been carried on under great difficulties owing to shortage of staff, the time of the Assistant in charge having been almost wholly occupied for the first eight months with investigations and constructive work on Nomenclature in preparation for the International Botanical Congress to be held at Cambridge in August, 1930 (see p. 42), and for the remainder of the year by administrative duties. In effect, the entire scientific work

of the section, which includes three extremely diverse floras—those of North America, Tropical America, and Temperate South America—each requiring special knowledge and training, has been performed by a single botanist, while at the same time there has been a marked increase in the collections received for critical identification, especially from Trinidad and British Guiana. Hence only the more urgent collections could be dealt with.

*Research and Publications.*—The work of checking the typescript of the Flora of Trinidad and Tobago was continued, and some of the more interesting results obtained were incorporated in a paper entitled “Notes on Trinidad Plants” (*K.B.* 1929, p. 75). Numerous new species of Ferns from Tropical America and the West Indies were described by Prof. Domin from specimens in the Herbarium (*K.B.* 1929, p. 215). A history and full description of *Dahlia coronata* Hort. was drawn up, showing its relationship with *D. coccinea* Cav. (*K.B.* 1929, p. 52). The new combination *Sphaeralcea Creeana* Sprague and Sandwith was given to a plant which has recently been received from several gardens and which, it was found, was in cultivation in England nearly a century ago and had been described and figured as *Malva Creeana* Graham (*K.B.* 1929, p. 203). Various nomenclatural and bibliographical investigations on American genera and species were also carried out. These are mentioned in the section on Nomenclature.

#### AUSTRALIA AND NEW GUINEA.

*Routine.*—No large collections of unnamed material have been received, and the taxonomic work has consisted chiefly in dealing with special queries on critical species. Many valuable collections of named plants have been presented by Messrs. F. A. Rodway and J. M. Black and by the Directors of the National Herbaria at Sydney and Melbourne and the Governments of Tasmania, Queensland and Western Australia. Altogether about 1000 Australian plants were laid in during the year.

A fine series of photographs of Victorian and other Australian Orchids by Mr. T. Green of Melbourne has been presented by the Bentham Trustees.

*Research and Publications.*—Owing to the wide field covered by the Assistant in charge, it has not been found possible to carry out any research on Australian plants apart from that mentioned above. A paper “Lilaeopsis in Tasmania and New Zealand,” by Dr. A. W. Hill, was published (*K.B.* 1929, p. 119). The large collection, by Brass, of Papuan Figs has been determined, and an enumeration of the specimens and descriptions of the new species appeared in the *Journal of the Arnold Arboretum*, vol. x. p. 142.

#### NEW ZEALAND.

*Routine.*—Many queries dealing with various difficult New Zealand genera continue to be received, and constitute the main portion of the work in this section. Extensive sets of specimens have been

presented by Drs. L. Cockayne and H. H. Allan, and by Mr. H. Carse, especially of the genera *Dracophyllum* and *Gaultheria*. In the latter genus the valuable series of natural hybrids are particularly interesting.

*Research and Publications.*—A detailed report on many species of the genus *Phalaris* was supplied to Dr. H. H. Allan, in connection with his work on *Phalaris tuberosa* and other species introduced into New Zealand. (See also under Australia.)

#### POLYNESIA.

*Routine.*—During the year the preliminary determination of the large collections made by Mr. W. Greenwood in Fiji has been completed, and work has been started on the valuable collection received from Dr. and Mrs. J. D. Tothill. With the assistance of a grant from the Empire Marketing Board, Mr. J. H. L. Waterhouse has been enabled to collect for Kew in the British Solomon Islands, and a valuable series of specimens has been received.

*Research and Publications.*—An account of the Leguminosae of Fiji is being drawn up in collaboration with Mr. Greenwood. A supplementary list of the grasses of Fiji, based on the collections of Dr. and Mrs. Tothill, is also in course of preparation.

#### FERNS.

The total number of specimens of ferns and fern allies laid into the Herbarium during the year was 3,468, which includes many arrears as well as most of the current collections. The Herbarium has been further enriched by a valuable donation of named duplicates from the late Dr. Eryl Smith collected by her in Siam, Malaya, the Dutch East Indies and French Indo-China.

The collections named during the year were as follows:—Bulgaria (coll. W. B. Turrill); Greenland (Oxford University Expedition, coll. C. G. Trapnell); Assam (coll. F. Kingdon Ward); Papua (coll. A. Wade); Hainan (coll. Eryl Smith); Sierra Leone (coll. F. C. Deighton); Liberia (coll. G. P. Cooper); Tanganyika Territory (coll. B. D. Burt); and Siam (coll. H. B. G. Garrett).

The naming and laying in of the large collections made in Siam by Dr. A. F. G. Kerr and in the Lushai Hills by the Rev. W. J. L. Wenger have been continued, but are not yet quite completed.

Progress has been made with arranging the Herbarium collection according to C. Christensen's "Index Filicum." About two-thirds of the entire collection has now been written up and arranged according to the sequence of that system.

#### BRYOPHYTA.

On Mr. Wright's retirement the charge of the *Bryophyta* was handed over to Mr. C. V. B. Marquand, and a commencement was made by him of sorting the material in the Store as far as his other duties permitted. A small number of current collections was named.



## ALGAE.

In the early part of the year interest was shown by several African botanists in the marine Algae of South Africa and especially in those of Natal. Two particularly fine collections were received for naming from the Museum of Pietermaritzburg, these being collected respectively at Ifafa in the Alexandra Division of Natal, and Richards Bay, Zululand. Freshly collected material has also been forwarded for identification by Miss H. Forbes, Government Botanist at Durban, who is making a special study of the marine Algae of that area. With a view to publishing a complete list of Natal seaweeds, a selection of specimens from the Natal Herbarium at Durban is being sent on loan to Kew, for revision. Lists of names of specimens from these three sources have been sent to the Institutions concerned and further instalments are to follow.

Several small collections of British Algae, both marine and freshwater, have been received for determination during the year. Amongst collections which have been incorporated that of Lewis Weston Dillwyn (the author of the celebrated work "British Confervae" published in 1809), presented to Kew by Mrs. Story Maskelyne in 1923, is the most important. This comprised some 170 specimens, all of which were examined before being laid in.

Miss Dickinson spent a week at Easter at the Marine Biological Station, Plymouth, facilities for study being afforded by Dr. C. E. Allen, Director of the Station. The neighbourhood was worked from Wembury Bay on the east to Cawsand Bay on the west. As a result of this visit a note appeared in the Journal of Botany on the occurrence of *Colpomenia sinuosa* in Britain.

Advantage was taken of Dr. Y. Yamada's visit in November and December to name certain critical Japanese Algae and to examine critically all the material of *Laurencia* in the Herbarium, a genus which is in great need of revision.

## LICHENS.

Sincere thanks are again due to Mr. R. Paulson for the voluntary help he has continued to give in naming collections of lichens. Those determined by him this year include collections from the Royal Botanic Gardens, Peradeniya, Ceylon (coll. A. H. G. Alston); Greenland (Oxford University Expedition, coll. C. G. Trapnell); Kaio Tao, Siam (coll. A. F. G. Kerr); Uruguay (Prof. F. Felippone); N. E. Tibet (coll. G. Forrest); Singapore (coll. T. F. Chipp), and other minor gatherings.

## FUNGI.

*Routine.* The usual large number of miscellaneous enquiries was received. The work of investigation falls roughly into three categories:—(1) the determination of specimens of fungi, both British and foreign; (2) the examination of diseased material, and advisory work; (3) the examination of type specimens and critical

comparisons for the assistance of research workers, both at home and abroad. Work in the third category takes up an increasing amount of time, and is extremely valuable in maintaining close relations between Kew and research workers both at home and in other parts of the world. During the current year such comparisons have been undertaken for mycologists in Australia, India, Egypt, and the United States, as well as for officers of the Advisory Service of the Ministry of Agriculture and Fisheries and for the Imperial Bureau of Mycology.

Among collections of fungi received and named during the year may be mentioned those from the Cameroons (T. D. Maitland), Nyasaland (E. J. Butler), South Africa (Department of Agriculture), Australia (J. B. Cleland), Trinidad (W. E. Broadway), and British Guiana (E. B. Martyn). In connection with work on the flora of British Guiana about 60 sheets of fungi from the herbarium at Georgetown were received on loan. These have been examined and the determinations checked or corrected.

Loan and exchange transactions were less heavy than in former years, but specimens have been sent to Herr Sydow for his work on Pyrenomycetes, and to various workers in the United States. From Herr Sydow about 30 specimens of fungi collected in Costa Rica were received in exchange for duplicate material sent from Kew.

Considerable time has been given to work on nomenclature and the preparation of a revised Code, which was undertaken by the Sub-Committee for Nomenclature appointed by the Imperial Botanical Conference in 1924 (see p. 42).

*Research and Publications.*—During the year two papers mentioned in the last report have been published, namely:—"Further notes on the connection between *Rhizoctonia Crocorum* and *Helicobasidium purpureum*," by W. Buddin and E. M. Wakefield (Trans. Brit. Myc. Soc. xiv, Mar. 1929, pp. 97-99), and "The fungus causing Leaf Rot of the Carnation," by W. Buddin and E. M. Wakefield (Trans. Brit. Myc. Soc. xiv, Oct. 1929, pp. 215-221).

For her Presidential Address to the British Mycological Society, Miss Wakefield prepared an account of the history of mycological work abroad, with special reference to work in the tropical possessions of the Empire. The address was entitled "Fungi Exotici: Past Work and Present Problems," and it will be published in the Transactions of the Society.

#### BIOLOGICAL AND GENETICAL HERBARIA.

Thanks mainly to the continued interest of members of the Kew staff, about 2,000 specimens have been added during the year to these collections. The space available in the small room next to the Visitors' room is being rapidly filled, and their future housing will have to be considered sooner than was anticipated. The collections are now in excellent order and are frequently consulted. Specimens illustrating phases of the life-history of any British species are welcomed.

## SUMMARY.

The following table summarises the routine work, apart from naming, accomplished by the regular staff and by the special Store staff during 1929.

Mounted*	...	...	...	...	62,876
Incorporated*	...	...	...	...	78,811
Duplicates distributed	...	...	...	...	10,481
Specimens received on loan	...	...	...	...	9,283
Specimens sent out on loan	...	...	...	...	5,829
Specimens presented or purchased (approx.)					62,000

## COLLECTION OF DRAWINGS AND PHOTOGRAPHS.

The artist has been engaged in preparing plates for the *Icones Plantarum*, photographing herbarium sheets and various living plants and groups of plants in the Gardens. The number of type-specimen sheets photographed was not so great as last year, being about 700 ; half of these were Kew types of which photographs were sent to other institutions and the other half were types borrowed from abroad, of which it was considered desirable to have photographs in the Kew collection.

Among the additions to the collection acquired this year was a very fine series of 900 stereoscopic negatives of Australian orchids presented by the Bentham Trustees. Prints of these will be made and added to the collection of photographs.

Over 500 other photographs and drawings were presented, among which were the following :—

A collection of coloured photographs from the Director of Migration and Settlement, Australia House ; 75 paintings of Travancore and other plants by the late Mrs. A. F. Broun, presented by Mr. A. F. Broun ; 74 original drawings for the *Botanical Magazine* from the Royal Horticultural Society. Sixty paintings of British plants by the late Mrs. Mary Jane Firmin were presented by Miss F. M. Lillie of Bournemouth, and 108 paintings of plants by the late Mrs. Ellis Rowan, made during her visits to New Guinea, were presented by Mr. W. H. Flavelle, formerly of Sydney, and now of St. Helier, Jersey. The work of Mrs. Firmin, who was the wife of the late Rev. John Firmin, at one time Rector of Eaton, near Congleton, Cheshire, is very good. The paintings were executed between 1858 and 1863, mostly from specimens collected in Cheshire and Worcestershire, and are named, apparently correctly. Mrs. Rowan's paintings are most beautiful works of art. They are on thin cardboard eleven inches square and each floral study is in a circle about nine inches in diameter. Analyses of the flowers are not given, identification has not been attempted by the artist, and unfortunately no precise information as to localities is supplied. Mr. Flavelle states that Mrs. Rowan made two journeys to New Guinea on his behalf, each of seven

\*These figures do not include the lower cryptogams.



months' duration, for the purpose of painting birds for him. On one of the journeys she lived practically all the time in Port Moresby hospital, going in and out with fever and painting in the intervals. On the other journey she stayed on a big plantation in New Britain, and also on the Bismarck Range in what was formerly German New Guinea. Many studies of flowers and birds made by Mrs. Rowan have been purchased by the Commonwealth Government of Australia. The drawings appear to be botanically accurate. Her work as shown by the paintings presented by Mr. Flavelle is most pleasing and certainly of considerable merit. It should not be difficult in due course to name the plants with a considerable degree of accuracy.

To the general collection of portraits has been added a good photograph of Mr. C. H. Wright, presented by himself. A set of 100 hand-coloured lantern slides of fungi was purchased from Col. C. T. Green.

To facilitate the photographing of herbarium specimens a room for this purpose has been allocated in the basement of the Herbarium. The room is fitted with a stand and vertical camera, and is lighted with special electric fittings so that specimens may now be photographed with uniform lighting.

#### NOMENCLATURE AND BIBLIOGRAPHY.

The constructive work on nomenclature which has been in progress for the past few years culminated in the preparation of a series of proposals\* to be submitted to the International Botanical Congress at Cambridge in August, 1930. The most important of these proposals is one for the revision of the International Rules of Nomenclature, put forward by the Sub-Committee on Nomenclature appointed by the Imperial Botanical Conference (London, 1924), which is composed of two botanists from the British Museum (Messrs. Ramsbottom and Wilmott), and two from Kew (Dr. Sprague and Miss Wakefield). The principal changes proposed are as follows :—

- (1) That the type-method should be explicitly recognised.
- (2) That a Latin diagnosis should no longer be made compulsory for names of new groups.
- (3) That *Tautonyms* ("duplicating binominals") should not be rejected as such. It has been found that their rejection has resulted in endless disputes as to the correct specific epithets of some of the species concerned.
- (4) That all *later homonyms* should be rejected, except where the earlier homonym was a *nomen nudum*.
- (5) An attempt has been made to remove various sources of ambiguity from the Rules. This necessitated a considerable amount of re-wording, and finally led to the re-drafting of

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\*International Botanical Congress, Cambridge (England), 1930 : Nomenclature Proposals by British Botanists, London, 1929.

the Rules as a whole. It is suggested that their title should be altered to "International Code of Botanical Nomenclature."

- (6) In order to facilitate consultation, certain changes have been made in the sequence of some of the articles, and some that dealt with more than one subject have been divided into two or more separate articles.
- (7) The establishment of a permanent International Advisory Committee on Nomenclature is advocated, its functions being as follows:—1. Interpreting the Code in doubtful cases; 2. Considering additional Nomina conservanda; 3. Considering all proposals for the modification of the Code; 4. Reporting on the effects of modifications of the Code accepted at the preceding Congress.

The other proposals which appeared under the same cover as the suggested "International Code" are put forward by individual botanists, including three members of the Kew Staff. They are as follows:—

- II. List of 90 additional generic names proposed for conservation (by T. A. Sprague). Among them are such well-known names as *Epidendrum*, *Ixia*, *Combretum*, *Nemophila*, *Gardenia*, *Celmisia*, *Olearia*.
- III. List of proposed standard-species for conserved generic names (by M. L. Green).
- IV. That the application of Linnean generic names should be determined by means of specified standard-species (by A. S. Hitchcock and M. L. Green).
- V. That a Sub-Committee be appointed to prepare a list of conserved generic names for the Fungi; and that in Fungi with a pleomorphic life-cycle whose perfect state is not known, the author who unites the various imperfect states should have the right of choosing the name to be used (by E. M. Wakefield).
- VI. That names proposed by non-binarist authors should be rejected (by A. J. Wilmott).
- VII. That no generic name which has fallen into complete disuse for a period of not less than fifty years shall be re-established if there is another legitimate name in use for the genus concerned (by I. H. Burkill).

The Assistant in charge of the Index Kewensis has been engaged in the preparation of a new edition of the 'Handlist of Tender Dicotyledons cultivated in the Royal Botanic Gardens, Kew,' about half of the work having been completed. This has involved the examination and identification of many of the plants cultivated in the Gardens, in addition to extensive nomenclatural research.

The scientific names adopted in the "List of Trade Names for Empire Timbers" have also been checked, and replies have been sent to numerous enquiries on nomenclature received from all parts of the world.

Among the bibliographical investigations carried out was an enquiry into the respective dates of publication of Bergius' *Descriptiones Plantarum* and Linné's *Mantissa Prima*, which is a matter of some importance for South African botanists. It was established that the work of Bergius appeared first.

The following papers dealing with nomenclature and bibliography were prepared at Kew and published during 1929:—

*Gardenia* or *Warneria* (*K.B.* 1929, p. 12).

The Correct Spelling of certain Generic Names: IV, V. (*K.B.* 1929, pp. 38, 241).

*Lagoseris* Marsch.-Bieb. and *Lagoseris* Hoffmegg. & Link (*K.B.* 1929, p. 54).

The Botanical Name of the Sugar Maple (*K.B.* 1929, p. 81).

*Engelmannia* and *Angelandra* (*K.B.* 1929, p. 82).

Bergius, *Descriptiones Plantarum*, and Linné, *Mantissa Prima* (*K.B.* 1929, p. 88).

*Crantziola* versus *Lilaeopsis* (*K.B.* 1929, p. 92).

Triana's *Flora Neo-Granadina* (*K.B.* 1929, p. 94).

Name changes in *Gomphostigma* (*K.B.* 1929, p. 143).

Conservation of the name *Gardenia* (*K.B.* 1929, p. 143).

The Botanical Name of Shrub Yellow-Root (*K.B.* 1929, p. 235).

#### INDEX KEWENSIS.

The first half of 1929 was spent almost entirely in seeing Supplement VII of the Index through the Press. This contains the new names published during the quinquennium 1921-25, as well as some which had been omitted from previous Supplements. It was published in September last, about three years after the publication of Supplement VI. Owing to the war, that Supplement, which concerned the period 1916-20, did not appear until 1926, so that the delay in the preparation of the Supplements has now been reduced by nearly two years. A review of Supplement VII appeared in *Kew Bull.* 1929, p. 323, and included an account of the various improvements introduced from time to time, the latest being the provision of a separate list of new genera under their respective families arranged alphabetically.

The compilation of Supplement VIII is well in hand, and the card catalogue now contains about 6,000 entries.

#### EXPERIMENTAL WORK.

Work in the experimental grounds at Kew and Potterne has been continued on the genera *Silene*, *Centaurea*, *Saxifraga*, *Ranunculus*, *Anthyllis*, and *Primula*. The immediate work in hand on the last genus should be completed in 1930 and it is proposed to replace it by experiments designed to study the flower morphology and biology of *Scilla non-scripta*. The interspecific tetraploid *Saxifraga potternensis* bred true in the F<sub>3</sub> generation and studies in its cytology have been completed. The most important



work published consists of two papers on the inheritance of colour and sex in *Ranunculus* (*Journ. Genetics* xxi. p. 169). Five "sex" forms have been discovered and classified in the genus, and cytological research enabled the morphological features to be linked with a "time factor," involving the interval between the reduction divisions in the anther and ovule respectively. Three papers on *Silene* have appeared in the *Kew Bulletin* during 1929 and a fourth is being prepared for publication. The work on *Geum* has been completed and will shortly be ready for press. An extension, with modifications, of the time-factor theory to *Saxifraga*, *Silene*, *Centaurea* and other genera has been successful. The interest and importance of the experimental work now being carried out can scarcely be over-estimated, and its effects on taxonomic work are likely to be very great.

#### TRANSPLANT EXPERIMENTS.

The transplant experiments initiated in 1927 by the British Ecological Society are being carried out at Potterne, near Devizes, Wilts, in the grounds of our Hon. Associate, Mr. E. M. Marsden-Jones, with assistance from Kew. Five species of British plants are being grown in five different soils at Potterne and also in ordinary garden soil at Kew. Every species is represented by 25 plants of known origin and similar genetical constitution in every one of the soils. Four large enclosures, 35 feet long, 10 feet broad and 3 feet deep, were erected to contain the imported soils: sand, calcareous sand, clay, and calcareous clay. The species already transplanted are: *Centaurea nemoralis* Jord., *Silene vulgaris* Garcke, *S. maritima* L., *Anthyllis vulneraria* L., and *Plantago major* L. Material of *Fragaria vesca* L. is being prepared for use as the sixth species. Soil analyses have kindly been made by Mr. C. G. T. Morison, M.A., of the School of Rural Economy, Oxford. Meteorological records have been kept since April.

A full report of the results obtained up-to-date has been prepared by Mr. E. M. Marsden-Jones and Dr. W. B. Turrill, and has been presented to the Transplant Committee and accepted for publication in the *Journal of Ecology* for August, 1930. The results of periodic records for the five species transplanted for the 5 to 18 months the plants have been in the beds are embodied in the report. The chief facts emerging to date are :—

The most obvious changes are taking place in *Silene vulgaris*, *S. maritima*, and *Plantago major*.

*Centaurea nemoralis* has shown little change but the general tone is better on the clays than on the sands, though flowering commenced first on the latter. The mean number of stems per plant was higher on the clays than on the sands. The main seedling germination was in the spring.

In *Anthyllis vulneraria* morphological changes of a qualitative nature have not occurred but interesting facts regarding selection

are apparent from the data obtained. The species is known to be calcicolous and this is in agreement with the high death rate on the sand and on Potterne soil. It is, however, certain that absence of lime is not the sole factor involved. The death-rate at Kew, following frosts, was very much higher than on the clay (or other soils) at Potterne, though the  $\text{CaCO}_3$  content is lower in the clay than in the Kew soil. Attack by wilt-causing fungi (*Verticillium*) blocking the vascular bundles of the root is often an immediate cause of death. Secondary flowering, stem heights and heads per stem, and seed germination showed the same sequence as that of tone and deaths. Edaphic factors are obviously important in causing the known natural limitation of this species and should be considered when it is proposed to cultivate *Anthyllis* as a forage plant. The Transplant results suggest that on suitable land it would be a valuable and relatively persistent crop.

*Plantago major* has proved, even within five months, exceedingly plastic. The original plant was a dwarf form and this habit has been very nearly retained on the sand and to a less degree on the calcareous sand. The measurements and figures given show the marked deviation in luxuriant growth which has occurred on the clay and amongst the Potterne reserves, and somewhat less on the chalky clay. Further developments in this species will be watched with interest.

*Silene vulgaris* on the calcareous sand is developing a marked "strict" habit similar to that which has been many times observed in individuals among wild populations. It is just possible that this change may prove to have a genetical basis. On the calcareous sand the foliage developed a lighter green colour, on the clay a more yellowish-green colour, and on the chalky clay a more blue-green colour than in the parent. Secondary growth occurred especially on the sand. General tone was best on the clay and worst on the calcareous sand. In pure *S. vulgaris* germination was restricted to the spring on all the soils and was best on the clay and worst on the calcareous sand and chalky clay.

In *S. maritima*, at the last record of 1929, there was a marked though irregular tendency for the plants on the sand to change to plants with smaller leaves and with more anthocyanin and a flatter habit than in the parent. On the calcareous sands the leaves were narrower and smaller, the plants were flattened, and the calyces had much more red anthocyanin than in the parent. On both clays there was little change from the parent. General tone at the last record was best on the chalky clay and worst on the clay (these records were made before the September drought). Seeds of *S. maritima* have marked autumn and spring discontinuous germination on all the soils. Spring seedlings were most numerous on the clay and least numerous on the calcareous sand. Autumn seedlings were most numerous on the chalky clay and least numerous on the clay. Autumn seedlings survived the 1928-29 winter only on the chalky clay (and at Kew).

To sum up : *Centaurea nemoralis* does not at present appear to be plastic, but is capable of survival under a wide range of edaphic conditions. *Silene vulgaris* is slowly plastic under certain edaphic conditions. *S. maritima* is decidedly more plastic than its congener. *Anthyllis vulneraria* is not plastic and is not capable of survival under a wide range of edaphic conditions. *Plantago major* is exceedingly plastic.

It is obvious that the experiments, if they are to yield a maximum of conclusive facts, will have to be continued for a long period of years. It is important to remember that the formation of soils from raw materials can be slowly followed in the beds. It is hoped that periodic analyses, for which arrangements have been made, will yield useful pedological data.

In *Centaurea nemoralis*, *Silene vulgaris*, *S. maritima*, and *Anthyllis vulneraria* extensive genetical research is being continued at Potterne and Kew, and this involves the use of lines from which the transplant materials originated. All experimental work is being correlated with field, laboratory, and herbarium studies.

Apart from actual changes in the plants and from stages in soil-making, many interesting biological facts are being observed and some are embodied in this report. The plants are grown in the absence of competition, and mass or individual differences must, on the whole, be due to edaphic factors. It is, however, necessary to emphasize that plants have an individuality, that the history of a given individual is never exactly like that of any other individual, that "accidents" happen to individuals, and that, therefore, records have usually to be of a statistical nature with the limitations of this method.

#### VISITORS.

Fewer visitors worked in the Herbarium during 1929 than in 1928, owing probably to the fact that many foreign and colonial botanists postponed their visits in view of the holding of the International Botanical Congress at Cambridge in 1930. 5,296 signatures appear in the visitors' book ; the names of the most notable or the most frequent of these, with an outline of their sphere of work, are given below.

Dr. O. Stapf and his staff engaged on the work of the Botanical Magazine and Index Londinensis (see *K.B.* 1929, p. 305) were, as in previous years, accommodated in the top floor of the library. Mr. W. J. Bean, after his retirement, has been a regular visitor, being occupied in the preparation of a Supplement to his "Trees and Shrubs Hardy in the British Isles."

Representatives from the staffs of various botanical institutions consulted the Herbarium and Library, particularly botanists from the British Museum (Natural History), the Imperial Forestry Institute (Oxford), and the John Innes Horticultural Institution.

Home workers engaged on various aspects of British or European botany included Messrs. H. Gilbert-Carter, J. Fraser, A. B.



Jackson, E. M. Marsden-Jones, C. Norman, H. W. Pugsley, and the late C. E. Salmon, whilst Dr. Giuseppi made several calls in connection with plants collected by him in the Balkan Peninsula. Miss I. Manton (Cambridge University) continued her work on the cytology of the *Cruciferae*, and Miss D. Milner Brown (Liverpool University) spent some six weeks at the herbarium and library during the summer studying the floral development of the *Rhizophoraceae* and *Myrtaceae*. Mrs. Clement Reid and Miss M. E. J. Chandler visited the Herbarium in the summer, continuing their investigations on the fruits and seeds from the Eocene beds on the Isle of Sheppey.

Among home workers in various fields of Cryptogamic botany were the late Dr. Eryl Smith, who paid many visits in connection with the determination of the ferns sent by Dr. A. F. G. Kerr from Siam, Mr. A. A. Bullock, who worked for two weeks as a volunteer on the same group, Mr. H. N. Dixon (mosses), Mr. R. Paulson (lichens, see p. 39), and Mr. W. B. Grove, who paid a short visit in order to study mycological literature.

Continental visitors included Dr. Johannes Lid (Botanical Museum, Oslo), who came to identify plants collected by him during his Spitzbergen expeditions, and Mrs. Hanna Czecczott (Cracow), who continued work on her Anatolian plants.

Of home workers engaged in research on Asiatic botany, Mr. H. N. Ridley, as a regular visitor, was concerned principally with the flora of British North Borneo, and Mr. I. H. Burkill and Dr. D. Hooper continued their work on the Dictionary of Economic Products of the Malay Peninsula. After three years' study, almost all of which was carried out at Kew, Dr. Hooper published his work "On Chinese Medicine: Drugs of Chinese pharmacies in Malaya" (Singapore, 1929), and he has commenced a similar study on Persian drugs in co-operation with Dr. J. M. Cowan. Prof. W. G. Craib, who was at Kew for over a month during the summer vacation, continued his studies on the Flora of Siam, being concerned chiefly with the families *Myrtaceae* to *Cucurbitaceae*. Thanks are again due to Prof. Craib for naming the supplies of plants sent regularly by Dr. A. F. G. Kerr from Siam. Mr. F. Kingdon Ward paid frequent visits to the Herbarium before his departure to Burma and French Indo-China in February and again after his return in October. Mr. W. R. Price visited Kew repeatedly in connection with his work on the Flora of Formosa.

Of other workers on Asiatic botany mention should be made of Dr. Yukio Yamada (Imperial University, Tokyo), who paid many visits in November and December in connection with his revision of the genus *Laurencia* and a critical examination of types of Japanese Algae. Mr. A. H. G. Alston, late Systematic Botanist to the Department of Agriculture in Ceylon, was also a frequent visitor, and Dr. A. F. G. Kerr, Government Botanist, Siam, spent several months of his leave at Kew working on his collections. Dr. Israel Reichert (Plant Pathologist to the Zionist Agricultural

Experimental Station, Tel-Aviv) visited the Herbarium almost daily during the last six weeks of the year in connection with his study of the fungi and lichens of Palestine.

Of African visitors Professor C. E. Moss (University of Witwatersrand, Johannesburg) prolonged his Christmas visit till the middle of June, being engaged in studies on the *Thymelaeaceae*, and on the *Hydrocharitaceae* and other aquatic plants of South Africa. Mr. and Mrs. R. G. N. Young (also of the Witwatersrand University) spent several weeks at Kew in the summer determining plants collected by them in Southern Rhodesia, and Mr. B. D. Burt, of the Game Preservation Department, was at Kew during January continuing the identification of his Tanganyika plants. Mr. T. Lloyd Williams (Government Botanist at Aburi, Gold Coast) spent some five or six weeks in the summer naming his collections, and Mr. H. G. Fourcade (late of the South African Department of Forests) was a frequent visitor in the autumn, studying the flora of the George and Knysna district. From November to the end of the year Mr. N. Douglas Simpson, of the Egyptian Public Works Department, was a regular visitor, naming his collections made in the Sudan.

General J. C. Smuts visited the Herbarium on two occasions in connection with Mr. Hutchinson's work on the African flora. The following botanists and agricultural or forestry officers, all of whom were engaged in working out their own collections during their leave, also paid short visits:—Major Guy Aylmer (Sudan), Messrs. F. C. Deighton (Sierra Leone), N. S. Haig (Uganda), A. Glendon Hill (Nigeria), F. R. Irvine (Achimota College, Accra), and H. V. Lely (Nigeria). Miss E. R. Napier spent three months at Kew before taking up her position in charge of the botanical collections at the Coryndon Memorial Museum, Nairobi.

Of home workers engaged on African botany mention should be made of Mr. S. Garside (Bedford College), Mrs. Cecil Sandwith, who spent over a week at Kew naming her collection of Rhodesian grasses, and Mr. N. E. Brown, who was a regular visitor, working chiefly on the genus *Mesembryanthemum* and on the *Iridaceae*.

American visitors were somewhat fewer than usual. Prof. M. E. Peck (Willamette University, Salem, Oregon) worked at Kew during May on the Flora of Oregon, and Miss S. G. Stokes, of San Diego, was at the same time revising the American species of the genus *Eriogonum*. Dr. A. S. Hitchcock (Department of Agriculture, Washington) was at Kew for about two weeks before leaving for South Africa, being interested chiefly in grasses and matters relating to nomenclature. Dr. J. M. Macfarlane (late of the University of Pennsylvania, Philadelphia) spent about a month in the Herbarium in late summer working at comparative morphology, and Dr. H. H. Rusby, who came to England to receive the Hanbury medal of the Pharmaceutical Society, spent several days working in the Herbarium. Dr. Ivan M. Johnston and Dr. Lyman B. Smith (both of the Gray Herbarium, Harvard University) were at Kew

during parts of August and September working at *Boraginaceae* and *Bromeliaceae* respectively, the former returning to Kew again in October after his visit to the Continent. Mrs. E. E. Clayton, of Cornell University, New York State, worked in the Library during November and December studying works on garden design. Two Canadian mycologists were regular visitors during 1929, namely Professor A. H. R. Buller (University of Manitoba, Winnipeg), who paid his usual visit in the summer vacation, and Dr. Bisby (Manitoba Agricultural College), who was at Kew during the early months of the year and again in the autumn studying chiefly Indian fungi on behalf of the Imperial Bureau of Mycology.

Mr. J. Calvert, of Queen's College, Belfast, was at Kew during November and December studying the Australian flora before taking up his duties as Assistant Botanist for Weeds Research under the Commonwealth Council for Scientific and Industrial Research, and Mr. H. F. Comber spent a few days in the Herbarium studying the flora of Tasmania before proceeding to that island on a collecting expedition, organised by well-known British Horticulturists.

Special thanks are again due to Miss Muriel M. Whiting for the voluntary assistance rendered by her throughout a large part of the year in connection with the arrangement of the Malayan collections.

#### ADDITIONS TO HERBARIUM.

The total number of specimens received during 1929 was about 62,000, of which 4852 were purchased. The chief sources from which they were obtained are given below. In addition to the usual specimens purchased and presented a large number were collected on the various journeys referred to on pp. 2-6. These are shown under the heading *Collected*.

EUROPE.—*Presented*: Great Britain, by Messrs. C. E. Hubbard, E. Drabble, J. E. Little, E. M. Marsden-Jones, F. Ballard, V. S. Summerhayes, E. Milne-Redhead, James W. White, C. W. Rudd, C. E. Salmon, Patrick M. Hall, F. Druce, R. H. Jeffers, E. Thurston, the Watson Exchange Club (per Mr. E. C. Wallace), Mr. C. H. Wright (Mosses), Dr. A. W. Hill, Dr. W. B. Turrill, Dr. C. G. Druce, Dr. Beatrice Lovibond (Herbarium of the late Rev. Leicester Darwall), Mrs. R. F. Burrow, Rev. H. J. Riddelsdell, Col. H. H. Johnston, the Welsh Plant Breeding Station, Aberystwyth University College (per Prof. R. G. Stapledon), and the Royal Horticultural Society (per Dr. O. Stapf); Sweden, by Dr. A. W. Hill; Tyrol, by Mr. J. W. Wyatt; Italy, by Prof. R. Pampanini; Bulgaria, by the Department of Botany, University of Sofia (per Prof. N. Stoyanoff); Roumania, *Flora Romaniaae Exsiccata*, Cent. viii, ix, by A. Borza (per Museum Botanicum Universitatis, Cluj); Thrace, by Mr. H. Griffith Tedd; Caucasus, by U.S.S.R. Society for cultural relations with foreign



countries (coll. E. A. Bush), Baku University, *Plantae orientales exsiccatae* (1928), Cent. iii, iv, by A. A. Grossheim and B. Schischkin (per Prof. A. A. Grossheim); Jugoslavia and Thessaly, by Dr. R. Giuseppi; Czechoslovakia, *Flora Exsiccata Reipublicae Bohemicae Slovenicae*, Cent. iv and v with Schedae, by Prof. D. J. Podpera.

*Purchased*: Mr. R. Findlay, British plants; Mr. F. P. Knight, British plants; Mr. T. O. Weigel, Spanish plants (coll. Sennan); Fr. Verdoorn, *Bryophyta Arduennae Exsiccata* Nos. 31-50.

ORIENT.—*Presented*: Palestine, by the Department of Agriculture, Palestine, and Col. R. Meinertzhagen; Iraq, by the Rev. F. A. Rogers; Persia, by Mr. B. Gilliat-Smith, the Botanical Museum, Lund (duplicates from Sintenis Herbarium Orientale, per Dr. T. C. E. Fries), and Capt. B. Stuart Horner; Cyprus, by the Agricultural Department (coll. C. B. Ussher).

*Collected*: Persia, Dr. J. M. Cowan and Dr. C. D. Darlington.

NORTH ASIA.—*Presented*: Central Asia, by the Botanical Institute of the University of Central Asia, Taschkent (Herbarium *Florae Asiae Mediae*, fasc. xiv-xx, per Dr. S. Vedensky).

CHINA AND JAPAN.—*Presented*: by the late Dr. Eryl Smith, Mr. D. Macgregor (coll. R. E. Chang), Nanking University (per Mr. C. Y. Chiao), the National Central University, Nanking (per Mr. Chao-chien Chang), the University of Amoy (per Mr. H. H. Chung), Dr. H. Handel-Mazzetti, Dr. C. Christensen (coll. E. E. Maire), the University of California, Berkeley (per Dean E. D. Merrill).

*Purchased*: Nanking University, Chinese plants.

INDIA AND CEYLON:—*Presented*: Assam, by Capt. F. Kingdon Ward, and Mrs. A. D. Parry; Burma, by Mr. D. Rhind, and Mr. C. E. Parkinson; Lushai Hills, by the Rev. W. J. L. Wenger; Ceylon, by Dr. J. Burt Davy (coll. Mr. F. W. de Silva), and the Department of Agriculture, Peradeniya (coll. Mr. A. H. G. Alston); various, by Mr. R. N. Parker, Mr. R. D. Anstead, Mr. M. Alam, Dr. F. H. Gravely, Dr. W. Youngman, Mr. D. N. Mahta, and Mr. W. Burns.

MALAY PENINSULA.—*Presented*: Various, by the Director, Botanic Gardens Department, Straits Settlements.

INDO-CHINA.—*Presented*: Siam, by the late Dr. Eryl Smith, Mr. H. N. Dixon (Mosses, coll. Dr. A. F. G. Kerr), Dr. A. F. G. Kerr (coll. Dr. A. F. G. Kerr, Nai Noe Rabil, Noi Put), Mr. H. B. G. Garrett.

*Purchased*: coll. Chaplain and Mrs. J. Clemens.

MALAY ISLANDS.—*Presented* : North Borneo (coll. D. D. Wood), by University of California, Berkeley (per Dean E. D. Merrill); Philippine Islands, by University of California, Berkeley (Pteridophyta Philippinensis Exsiccata, Cent. ii, per Prof. E. B. Copeland); various, by the Director, Botanic Garden, Buitenzorg; New Guinea, by Arnold Arboretum (coll. L. J. Brass).

POLYNESIA.—*Presented* : Fiji, by Mr. W. Greenwood, Dr. and Mrs. J. D. Tothill; Rarotonga, by Mr. Gerrit P. Wilder; Easter Island, by Messrs. Balfour, Williamson & Co., Ltd. (per Prof. R. G. Stapledon); Hawaii, by Dr. Earl E. Sherff.

*Collected* : Solomon Islands, by Mr. J. H. L. Waterhouse.

AUSTRALIA.—*Presented* : New South Wales, by Dr. F. A. Rodway, Mr. J. N. Whittet, and the Director, Botanic Gardens, Sydney; Queensland, by Mr. C. T. White, Government Botanist; South Australia, by Mr. J. M. Black, and Mr. E. W. Pritchard; Victoria, by the Director, National Herbarium, South Yarra, and Mr. C. French; Western Australia, by Mr. C. A. Gardner, Government Botanist.

*Purchased* : Tasmania (per Tasmanian Museum and Art Gallery, Hobart).

NEW ZEALAND.—*Presented* : by Dr. L. Cockayne, Dr. H. H. Allan, Mr. H. Carse, and Mr. W. R. B. Oliver.

WEST TROPICAL AFRICA.—*Presented* : Nigeria, by Capt. A. S. Thornehill, Mr. H. V. Lely, Mr. A. Glendon Hill, and the Agricultural Department, Ibadan (coll. Mr. A. F. Findlay and Mr. H. G. Poynter); Sierra Leone, by the Lands and Forests Department (coll. Messrs. F. C. Deighton and H. H. Glanville); Liberia (coll. Mr. G. Procter Cooper), by Yale University School of Forestry, per Prof. S. J. Record; Gambia, by the Department of Agriculture; Gold Coast, by Mr. F. R. Irvine, Dr. J. Burt Davy, and the Forestry Department (coll. Mr. C. Vigne); Belgian Congo, by Prof. E. De Wildeman, Dr. A. B. Rendle, and Dr. W. Robyns.

NORTH-EAST TROPICAL AFRICA.—*Presented* : Sudan, by Lady Maffey, Mrs. Rugman, Mr. N. Douglas Simpson, Dr. Olaf Hagerup; Somaliland, by Mrs. E. Burne; Abyssinia, by Mr. R. A. Farquharson.

*Collected* : Sudan, by Major T. F. Chipp; Somaliland, by Mr. C. N. Collenette.

EAST TROPICAL AFRICA.—*Presented* : Uganda, by the Department of Agriculture (coll. Mr. L. C. C. Liebenberg), and Mr. J. D. Snowden; Tanganyika Territory, by the Department of Agriculture (coll. Mr. A. E. Haarer), Miss Eva Stuart-Watt, and the East African Agricultural Research Station, Amani (coll. Mr. P. J. Greenway and others);

Kenya, by the Agricultural Department (coll. Mr. H. J. Taylor and Mr. J. McDonald), Dr. R. E. Fries, and the Forestry Department (coll. Mr. H. M. Gardner); Nyasaland Protectorate, by Mr. Frank Barker; Rhodesia, by the Department of Agriculture (coll. Mr. F. Eyles), Mr. R. G. N. Young, Miss Joyce M. Marks, and Mrs. C. Sandwith.

*Collected* : Tanganyika Territory, by Mr. A. D. Cotton.

MASCARENE ISLANDS.—*Presented* : Mauritius, by Mr. R. E. Vaughan; Madagascar, by Mr. J. Groves (coll. Mr. T. B. Blow).

SOUTH AFRICA.—*Presented* : Cape Province, by Mr. A. H. Maude, Prof. C. E. Moss, and the Division of Plant Industry, Pretoria; various, by Commander T. M. Salter, R.N., Dr. J. Burt Davy, Mr. N. E. Brown, the Albany Museum, Grahamstown, and Dr. A. U. Däniker (coll. Schlechter).

*Purchased* : Mr. E. G. Bryant, miscellaneous African specimens.

*Collected* : various, by Mr. J. Hutchinson.

NORTH AMERICA.—*Presented* : Canada, by Dr. E. H. Moss; United States, by U.S. Department of Agriculture, Dr. A. S. Hitchcock (North American grasses, Cent. x.), U.S. National Museum (per Dr. W. R. Maxon), Pomona College, Claremont, California (per Dr. Philip A. Munz), Mr. F. Rilstone (mainly Ex Herb. F. K. S. Beatty); various, by the Field Museum of Natural History, Chicago.

CENTRAL AMERICA.—*Presented* : Yucatan, by the Field Museum of Natural History, Chicago (coll. Gaumer), Dr. J. Burt Davy (coll. Gaumer), and Dr. Woronoff.

*Purchased* : Mr. W. A. Schipp, British Honduras plants.

WEST INDIES.—*Presented* : Trinidad, by the Department of Agriculture (coll. Mr. R. O. Williams).

*Purchased* : Mr. W. E. Broadway, British West Indies plants.

EAST TROPICAL SOUTH AMERICA.—*Presented* : Brazil, by Dr. A. Ducke, Director of the Botanic Garden, Rio de Janeiro, Dr. H. A. Gleason, and Dr. G. Samuelsson; British Guiana, by the Department of Agriculture (coll. Mr. E. B. Martyn).

*Collected* : British Guiana, by Mr. N. Y. Sandwith.

WEST TROPICAL SOUTH AMERICA.—*Presented* : Venezuela, by Dr. H. Pittier; various, by the U.S. Department of Agriculture (per Dr. A. S. Hitchcock), and Major R. H. Thomas.

*Purchased* : Dr. José Steinbach, Bolivian Plants.

TEMPERATE SOUTH AMERICA.—*Presented* : Patagonia, by Mr. A. H. Hunter; various, by the Gray Herbarium, Harvard University.



*Purchased* : Prof. Gilberto Montero, Chilian plants ; Señor S. Venturi, N. Argentine plants ; Dr. Donat, Patagonian plants.

#### DISTRIBUTION OF DUPLICATES.

The following were the principal institutions to which duplicates were distributed :—

*Great Britain and Irish Free State.*—Aberdeen, Cruickshank Botanic Garden ; Cambridge University, Botany School ; Dublin, Trinity College, Botany Department ; Edinburgh, Royal Botanic Garden ; London, British Museum (Natural History) ; Oxford, Imperial Forestry Institute.

*Europe.*—Berlin, Botanic Gardens and Museums ; Brno, Masaryk University ; Brussels, Bôtanic Gardens ; Copenhagen, University Botanic Museum ; Geneva, Delessert Herbarium ; Leningrad, Principal Botanic Garden ; Paris, École des Hautes Études ; Riga, Latvian Plant Disease Research Institution ; Sofia, University, Department of Botany ; Stockholm, Riksmuseet.

*Africa.*—Amani, East African Agricultural Research Station ; Cape Town, South African Museum, Bolus Herbarium ; Khartoum, Department of Agriculture and Forests ; Pretoria, Division of Plant Industry.

*Asia.*—Amoy, University ; Baku, University ; Nanking, National Central University ; Singapore, Botanic Gardens ; Tokyo, University.

*Australia and New Zealand.*—Brisbane, Queensland Herbarium ; Canberra, Federal Capital Commission ; Palmerston North, Department of Agriculture.

*America.*—University of California, Berkeley ; Chicago, Field Museum ; Harvard University, Gray Herbarium ; New York, Botanical Garden ; Washington, D.C., U.S. National Museum.

#### The Library.

The following remarks refer to the more important additions received as presentations during the year.

Books presented by the Bentham Trustees :—J. A. Schultes, *Grundriss einer Geschichte und Literatur der Botanik von Theophrastos Eresios bis auf die neuesten Zeiten*, etc., Wien, 1817 ; W. Houston, *Reliquiae Houstonianae* . . . juxta exemplar Londinense, editio in Germania prima, Norimbergae, 1794 ; C. Singer, *The Herbal in Antiquity* (in *Journal of Hellenic Studies*, vol. xlvii, 1897) ; John Evelyn, *Silva* . . . with notes by A. Hunter, ed. 4, London, 1812 ; W. B. Turrill, *The plant-life of the Balkan Peninsula*, Oxford, 1929 ; two scarce works of C. H. Persoon, *Icones et descriptiones fungorum*, Paris, 1798-1800, and *Icones pictae rariorum fungorum*, Paris, 1803-08 ; and a complete set so far as published of the *Flora of Tropical Africa*. Several periodicals received in exchange for *Hooker's Icones Plantarum* have also been presented by the Bentham Trustees.

The following have been presented by the Carnegie Institution of Washington :—*Studies in the fossil flora and fauna of the Western United States*, by R. W. Chaney, L. Miller, and J. R. Dice, 1925 (Publ. no. 349) ; *The Marine Algae of Florida with special reference to the Dry Tortugas*, by W. R. Taylor, 1928 (Publ. no. 379) ; *The hydrostatic-pneumatic system of certain trees : movements of liquids and gases*, by D. T. MacDougal, J. B. Overton, and G. M. Smith, 1929 (Publ. no. 397) ; and *Plant competition : an analysis of community functions*, by F. E. Clements, J. E. Weaver, and H. C. Hanson, 1929 (Publ. no. 398).

From the Czech Academy of Sciences and Arts, Prague, several of its publications have been received. These include : *Bulletin International*, *Classe des Sciences Mathématiques, Naturelles, etc.*, xxviii<sup>e</sup> Année (1926) ; *Fauna et Flora Cechoslovenica*, I-II (1926-28) ; and *Palaeontographica Bohemiae*, xi-xii (1928).

The United States Department of Agriculture has continued to send many of its useful publications including the *Experiment Station Record*, *Journal of Agricultural Research*, the *Yearbook of Agriculture*, *Farmers' Bulletins* and numerous *Technical Bulletins* and *Miscellaneous Publications*, among the latter (no. 36) being *A history of agricultural education in the United States, 1785-1925*, by A. C. Trew. The library is also especially indebted to the Department of Agriculture, Industry and Commerce in the Dutch East Indies, the Botanic Garden, Buitenzorg, and the Bureaux of Science, Agriculture and Forestry of the Philippine Islands for liberal contributions.

Lieut.-Col. Sir David Prain has presented numerous issues in continuation of several periodicals, including :—*Bulletin de la Société Botanique de France*, *Berichte der Deutschen Botanischen Gesellschaft*, *South African Journal of Natural History*, *The South Eastern Naturalist and Antiquary*, *The Quarterly Journal of Pharmacy*, *Proceedings of the American Philosophical Society*, and *Comptes-Rendus des Séances de l'Académie des Sciences Coloniales, Paris*.

Mr. W. F. Wilson has presented a number of valuable publications of the Bernice P. Bishop Museum, Honolulu, among which are the following Memoirs by W. T. Brigham :—*Index to the Islands of the Pacific Ocean* (vol. i, no. 2, 1900) ; *Mat and basket weaving by the ancient Hawaiians* (vol. ii, no. 1, 1906) ; and *Ka Hana Kapa : the making of bark cloth in Hawaii* (vol. iii, 1911, text and plates).

The first volume of the *Index Londinensis*, the new edition of G. A. Pritzel's *Iconum botanicarum Index*, which is being prepared under the auspices of the Royal Horticultural Society of London at the Royal Botanic Gardens, Kew, by Dr. Otto Stapf, and published by the Clarendon Press, Oxford, was issued in October and is the subject of reviews in the *Kew Bulletin*, 1929, p. 305, and *Nature* of January 11, 1930, p. 42. A copy has been presented by the Royal Horticultural Society.

Books received from the Editor of *Nature* are :—F. I. Oakley, *Long vegetable fibres*, 1928 ; J. F. Rayner, *A supplement to Frederick*

Townsend's *Flora of Hampshire and the Isle of Wight*, 1929; and 4 small works on gardening.

Books received from their publishers :—J. W. Bews, *The world's grasses: their differentiation, distribution, economics and ecology*, from Messrs. Longmans, Green & Co.; M. Büsgen, *The structure and life of forest trees*, third edition by E. Münch, translated into English by T. Thomson, from Messrs. Chapman & Hall; J. D. Gimlette, *Malay Poisons and charm cures*, third edition, from Messrs. J. & A. Churchill; *Index Kewensis*, Supplementum VII (10 copies), from the Clarendon Press, Oxford; Mrs. S. D. McKelvey, *The Lilac: a Monograph*, 1928, Sir H. A. Nicholls, *A text-book of tropical agriculture*, revised by J. H. Holland, and W. J. Robbins & H. W. Rickett, *Botany: a Textbook*, etc., from Messrs. Macmillan; H. H. W. Pearson, *Gnetales*, from the Cambridge University Press; H. Hamel Smith, *Sisal: production and preparation*, from Messrs. John Bale, Sons & Danielsson, and W. B. Turrill, *The plant-life of the Balkan Peninsula*, from the Clarendon Press, Oxford. All except Mrs. McKelvey's work were published in 1929.

The Empire Cotton Growing Corporation and the Empire Marketing Board have presented a number of the publications issued by them, and a set of the publications issued in connection with the Conference of Empire Meteorologists, 1929, Agricultural Section, has been received from the Ministry of Agriculture and Fisheries.

The following are independent works or in some cases separates from periodicals and other publications which have been presented by their authors unless otherwise stated :—S. Fróes Abreu, *O côco barbaú e o problema do combustível*, published by the Estação Experimental de Combustíveis e Minerios, Ministerio da Agricultura, Rio de Janeiro; R. S. Adamson and others, *The botanical features of the South Western Cape Province* (from Dr. A. W. Hill); Y. Asami, *The crab-apples and nectarines of Japan*, 1927 (from the Marquis Nabeshima); L. H. Bailey, *Gentes herbarium*, vol. ii, fasc. 1-2, 1928-29; J. M. Black, *Flora of South Australia*, part IV, completing the work; E. Blatter, C. McCann, and T. S. Sabnis, *The flora of the Indus Delta*, reprinted from the *Journal of the Indian Botanical Society*, 1927-29; Mrs. Frank Bolus, *Notes on Mesembrianthemum and allied genera*, part 2, pp. 33-146 (3 copies), 1928-29; *Third British Empire Forestry Conference, Australia and New Zealand*, 1928, 4 publications (from the Commonwealth Forestry Bureau, Canberra); V. F. Brotherus, *Symbolae Sinicae*, Teil. IV, Musci (from Mr. George Brotherus); A. F. Broun and R. E. Massey, *Flora of the Sudan* (from Director of Agriculture and Forests, Sudan Government); O. Buchtien, *Contribuciones a la flora de Bolivia*, pt. 1, 1910 (from Dr. E. Asplund); H. A. Chilvers, *The seven wonders of South Africa* (from Director, Publicity Bureau, South Africa House); L. Cockayne and E. Phillips Turner, *The trees of New Zealand*, 1928; *Letters of John Cockburn of Ormistoun to his gardener, 1727-1744*, edited by James Colville, 1904 (from Mr. T. Hay);



Willemina M. Coelingh, *Over stoffen die invloed uitoefenen op de aggregatie bij Drosera* (Proefschrift); Grace M. Crowfoot, *Flowering plants of the Northern and Central Sudan*, 1928 (from Director of Agriculture and Forests, Sudan Government); É. De Wildeman, (1) *Contribution à l'étude de la flore du Katanga*, supplément II (from Comité Spécial du Katanga); (2) *Plantae Bequaertianae*, vol. iv, fasc. 4; J. F. Duthie, *Flora of the Upper Gangetic Plain*, etc., vol. iii, pt. 3 (3 copies) (from the Government of India Central Publication Branch, Calcutta); A. Edwards, *Rock gardens: how to plan and plant them*; B. Fedtschenko, *Flora Transbaicalica*, pars 1; *Field notes of trees, shrubs and plants other than Rhododendrons, collected in Western China by Mr. George Forrest*, 1917-19 (from the Royal Horticultural Society); W. G. Freeman and R. O. Williams, *The useful and ornamental plants of Trinidad and Tobago*, ed. 2, 1928 (from Director of Agriculture, Trinidad and Tobago); E. E. Galpin, *Botanical Survey of South Africa*, Memoir no. 12: *Botanical Survey of Springbok Flats, Transvaal*, 1928 (from Dr. E. J. Butler); G. Glas, *The history of the discovery and conquest of the Canary Islands*, 1764 (from Sir Daniel Morris); S. Grieve, *Physical changes brought about by the floating power of seaweed*, reprinted from *Trans. Bot. Soc. Edinb.* xiv, pt. 2, and xxx, pt. 2; U. P. Hedrick and others, *The vegetables of New York*, vol. i, pt. 1: *Peas of New York*, 1928; E. Hultén, *Flora of Kamtschatka and the adjacent islands*, III, in *K. Svenska Vet.-Akad. Handl.* 3, viii, no. 1; E. Julius and A. L. Pinches, *Forestry Handbook, South Australia*, 1928 (from Conservator of Forests, South Australia); F. Kraenzlin, *Beiträge zur Kenntnis der Familie der Myoporinae R. Br.*, in *Fedde, Repertorium, Beihefte*, Bd. liv; A. Lemée, *Dictionnaire descriptif et synonymique des genres de plantes phanérogames*, tome i; Mrs. M. R. Levyns, *A Guide to the flora of the Cape Peninsula*; J. C. Liu, *Enumeration of plants collected by the late Mr. N. H. Cowdry in Chihli Province (and Chefoo)*, 1928, in *Bull. Peking Soc. Nat. Hist.* vol. ii, pt. 3 (from Mr. S. T. Dunn); C. Luerssen, *Grundzüge der Botanik*, Auflage 4, 1885 (from Mr. I. H. Burkill); Mrs. S. D. McKelvey, *The Lilac: a Monograph*, 1928; A. H. Magnusson, *A Monograph of the Scandinavian species of the genus Acarospora*, 1924, in *Göteborgs Kgl. Viten-skaps- och Vitterhets- Samhälles Handl.* xxviii, 2; J. H. Maiden, *A critical revision of the genus Eucalyptus*, parts 70 to 72, 1928-29 (from Director, Botanic Gardens, Sydney); S. Mangham and W. Rae Sherriffs, *A first biology*, 1928 (from Prof. S. Mangham); K. Mason, *Exploration of the Shaksgam Valley and Aghil Ranges*, 1928 (from Mr. C. E. C. Fischer); T. Nakai, *Flora sylvatica Koreana*, pars XVII, 1928 (from Director, Forestal Experiment Station, Chosen); *Descriptive guide to the . . . New York Botanical Garden*, 1920 (from Mr. I. H. Burkill); *North American Flora*, vol. 23, pt. 3, 1928, vol. 24, pts. 5-7 (from Dr. N. L. Britton); *Report of the Scientific Results of the Norwegian Expedition to Novaya Zemlya*, 1921: Botany, edited by B. Lynge, 1928 (from the Editor); *Nova Guinea: Résultats des Expéditions scientifiques à la Nouvelle*

Guinée, vol. xiv, Botanique, livr. 3 (from Maatschappij ter Bevordering van het Natuurkundig Onderzoek der Nederlandsche Koloniën); Mrs. Richenda Parham, *Some medicinal plants of Vanua Levu* [Fiji], printed for private circulation, not dated; H. Pittier, *Arboles y arbustos nuevos de Venezuela*, dec. 4 and 5, 1925; H. S. Redgrove and G. A. Foan, *Blonde or brunette? A complete account of the theory and practice of hair-dyeing in all its branches* (from Mr. H. S. Redgrove); L. Rodway, *The Tasmanian flora*, 1903, with a few MS. additions, copy serving as an index to the Tasmanian Museum Herbarium (from Mr. A. V. Giblin); A. S. Sabrae, *Forestry in Denmark: a guide to foreigners*, 1926 (from Mr. C. S. Larsen); A. M. Sawyer and D. Nyun, *A classified list of the plants of Burma*, 1927 (from Mr. F. N. Howes); *Festschrift Hans Schinz*, 1928, forms *Beiblatt zur Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich*, Jahrg. 73 (from Dr. Hans Schinz); S. Schonland, *Materials for a critical revision of Crassulaceae: the South African species of the genus Crassula L.*, in *Trans. R. Soc. S. Africa*, vol. xvii; J. J. Smith, *Sokolodaceae* [of New Guinea], in *Nova Guinea*, vol. xiv, livr. 3; M. Sokolowski, *O górnej granicy lasu w Tatrach (La limite supérieure de la forêt dans le massif des Tatras)*, 1928; K. Starcs, (1) *Koku un krumu noteicejs*, 1925 (*Handbook of the trees and shrubs of Latvia*); (2) *Latvijas pavasaraugu noteicejs*, 1924-27 (*Handbook of the spring-flowering plants of Latvia*); N. Stoianov and B. Stefanov, *Flore de Bulgarie* (in Bulgarian), 1924-25, in 2 vols. (from Mr. R. A. C. Sperling); M. H. F. Sutton, *Red Clover: comparative trials, etc.*; H. Trotter, *The common commercial timbers of India and their uses*; H. Uittien, *Ueber den Zusammenhang zwischen Blattneratur und Sprossverzweigung*; N. I. Vavilov and D. D. Bukinich, *Agricultural Afghanistan*, forms Suppl. 33 to the *Bulletin of Applied Botany*, etc., Leningrad; *Field notes of Rhododendrons and other plants collected by Kingdon Ward in 1927-28*, 3 copies (from Mr. Lionel de Rothschild); Johanna Westerdijk and Christine Buisman, *De iepenziekte: rapport over het onderzoek verricht op verzoek van de Nederlandsche Heidemaatschappij*; E. H. Wilson, *China: Mother of Gardens*, the subject matter of which has been taken from the author's *A Naturalist in Western China*, 1913; H. Wirz-Luchsinger, *Erhebungen über die Verbreitung der wildwachsenden Holzarten in der Schweiz*, Lieferung 5, Kanton Glarus, 1928 (from Sekretariat der Eidgen. Inspection für Forstwesen, Jagd und Fischerei in Bern); and Z. Yoshino, *Florula Bitchuenensis*.

The periodical and serial publications presented during the year include the following, which have been received from their editors or from the societies or institutions issuing them, unless otherwise stated:—*Acta Botanica Fennica*, 4-5; *Acta Horti Bergiani*, vol. ix; *Acta Horti Botanici Universitatis Latviensis*, vol. iii, nos. 1-3; *Acta Horti Goltoburgensis*, vol. iv; *Acta Instituti et Horti Botanici Universitatis Tartuensis* (Dorpatensis), vol. i, fasc. 4 and vol. ii, fasc. 1-2; *Acta Phytochimica* (Tokyo), vol. iv, nos. 2-3; *Agros*:

*Boletim da Associação dos Estudantes do Instituto Superior de Agronomia* (Lisbon), numero especial, 1929; *Anales del Museo Nacional de Historia Natural Bernardino Rivadavia* (Buenos Aires), tomo xxxiv; *Annales de la Société Linnéenne de Lyon*, 1928 (from Dr. A. W. Hill); *Annals of the Agricultural Experiment Station*, Chosen, vol. iv, nos. 3-4; *Annals of the Royal Botanic Gardens*, Peradeniya, vol. xi, pt. 2; *Arbejder fra den Botaniske Have i København*, nos. 114-115; *Archief voor de Theecultuur in Nederlandsch-Indië*, 1928, nos. 3-4 and 1929, nos. 1-4; *Archives du Muséum d'Histoire Naturelle* (Paris), 6<sup>me</sup> série, tome iii; *Australasian Association for the Advancement of Science, Report of the 10th Meeting*, 1929; *Bernice P. Bishop Museum, Honolulu, Bulletin* 55 and 65; *Boyce Thompson Institute for Plant Research* (Yonkers, New York), *Contributions*, vol. i, nos. 7-8 and vol. ii, nos. 1-3, and *Professional Papers*, nos. 10-13; *British Association for the Advancement of Science, Report of the 96th Meeting*, 1928 (from Miss E. M. Wakefield); *British Fern Gazette*, vol. v, nos. 11-12 (from Mr. C. H. Wright); *Bulletin de l'Institut et du Jardin Botaniques de l'Université de Belgrade*, tome i, no. 2; *Bulletin of the Kagoshima Imperial College of Agriculture and Forestry*, no. 7; *Bulletin of the Miyazaki College of Agriculture and Forestry*, 1929, no. 1; *Bulletin of Popular Information* (Arnold Arboretum), series 3, vol. iii; *Bulletin of the Rubber Growers' Association*, vol. xi; *Bulletin de la Société Botanique de Genève*, vol. xx, fasc. 2; *Bulletin de la Société Linnéenne de Lyon*, 1929 (from Dr. A. W. Hill); *Canadian Alpine Journal*, vol. xvi; *Chanousia: Giardino Botanico Alpino dell'Ordine Mauriziano al Piccolo S. Bernardo*, *Annuario*, no. 1, 1922-27; *Contributions from the Gray Herbarium of Harvard University*, 83-84; *Contributions du Laboratoire de Botanique de l'Université de Montréal*, nos. 12-13; *Contributions from the Osborn Botanical Laboratory* (Yale University), 10 papers; *Curtis's Botanical Magazine*, Index to volumes for 1905 to 1925 (except 1921), prepared by R. C. Notcutt (typed copy from Mr. W. Cuthbertson); *Darwiniana: Carpeta del "Darwinion," Laboratorio particular del Doctor C. M. Hicken* (Buenos Aires), tomo i, nos. 3-8 and tomo ii, no. 1; *East Malling Research Station, Annual Reports*, 1926-28; *Erdészeti Kísérletek* (Forest Researches, Sopron, Hungary), xxx, pt. 4 and xxxi, pts. 1-2; *The Empire Cotton Growing Review*, vol. vi; *Estación Agronómica de Moca, Republica Dominicana*, several botanical publications; *Forestry: the Journal of the Society of Foresters of Great Britain*, vol. iii, no. 1; *Hardy and Half-hardy Plants: a Monthly Magazine*, etc., edited and published by A. W. Darnell, vol. i, nos 1-3; *Indian Forester*, vol. lv; *Indian Tea Association, Quarterly Journal*, 1928, pt. 4 and 1929, pts. 1-3; *Japanese Journal of Botany*, vol. iv, nos. 3-4; *Journal of the Council for Scientific and Industrial Research* (Commonwealth of Australia), vol. ii, nos. 1-3; *Journal of the Department of Agriculture of Victoria*, vol. xxvii; *Journal of the Federated Malay States Museums*, vol. viii, pt. 3 and vol. xiv, pts. 3-4; *Kungl. Svenska Vetenskapsakademiens Handlingar*, ser. 3, Bd. vi; *Long Ashton Agricultural and Horticultural*



*Research Station, Annual Report*, 1928; *Malayan Forest Records*, no. 6; *Mangrove forests of the Malay Peninsula*, by J. G. Watson; *Mededeelingen van 's Rijks Herbarium, Leiden*, no. 58; *Monograph of Aristida*, by J. Th. Henrard; *Mémoires de l'Académie Malgache*, fasc. v-vi (from the Rev. Dr. James Sibree); *Memoirs of the College of Agriculture, Kyoto Imperial University*, no. 7; *Natural History Magazine* (British Museum, Natural History), vol. ii, no. 9-12; *Nederlandsch Kruidkundig Archief*, 1927-29; *Notes from the Royal Botanic Garden, Edinburgh*, nos. 81-82; *Oxford Forestry Memoirs*, nos. 8-9; *Orchid Review*, 1929; *Proceedings of the Imperial Academy* (Japan), vol. iv, no. 10 and vol. v, nos. 1-8; *Proceedings of the Isle of Wight Natural History and Archaeological Society*, 1928 (containing: *The cliff-founder and landslide at Gore Cliff, Isle of Wight*, by G. W. Colenutt); *Proceedings of the Royal Irish Academy*, Sect. B, vol. xxxviii, no. 15, and vol. xxxix, nos. 1-2; *Publications de la Faculté des Sciences de l'Université Masaryk* (Brno), nos. 79, 96, 110-111; *Publications of the Hartley Botanical Laboratories* (University of Liverpool), nos. 3-6; *Quarterly Journal of Forestry*, vol. xxiii; *Queensland Agricultural Journal*, vol. xxxi-xxxii; *Recueil des Travaux Botaniques Néerlandais*, vol. xxv and vol. xxva (Volume jubilaire Hugo de Vries); *Research Studies of the State College of Washington*, vol. i, nos. 1-2; *The Rose Annual of the National Rose Society*, 1929; *Rubber Research Institute of Malaya, Quarterly Journal*, vol. i, nos. 1-3, and *Annual Report*, 1928; *Science Reports of the Tohoku Imperial University* (Sendai, Japan), 2nd series, vol. xii, no. 1 and vol. xiii, nos. 1-2; 4th series, vol. iii, no. 4, fasc. 2, and vol. iv, nos. 1-3; *Sinensia: Contributions from the Metropolitan Museum of Natural History, National Research Institute, Nanking*, vol. i, no. 1; *The Singapore Naturalist*, nos. 1-5 and continuation as *The Malayan Naturalist*, vol. ii, no. 1 (from Mr. I. H. Burkill); *Studies from the Tokugawa Institute* (Tokyo), vol. i, no. 3; *Sudan Notes and Records*, vol. i-xii, pt. 1 (a few parts missing); *Suomen Metsätieteellinen Seura* (Society of Forestry in Finland), *Silva Fennica*, 9-12, and *Commentationes forestales*, 1-2; *The Tea Quarterly: the Journal of the Tea Research Institute of Ceylon*, vol. ii, pts. 1-3; *Transactions of the Agricultural Land Branch, Land Department, Chinese Eastern Railway, Bulletin*, nos. 1, 3-4; *Transactions of the Royal Society of Canada*, ser. 3, sect. v, vol. xxii, pt. 2; *Transactions of the Royal Society of South Africa*, vol. xviii, pts. 1-3; *Travaux de l'Institut Botanique Léo Errera*, 1928 (11 reprints); *Travaux des Laboratoires de Matière Médicale et de Pharmacie Galénique de Paris*, tome xix (from Prof. É. Perrot); *Tropical Woods*, nos. 17-20; *The Ukrainian Botanical Review*, vol. iii-v; *University of California Publications in Botany*, vol. 14, nos. 19-20 and vol. 15; *University of Colorado Studies*, vol. xvi, no. 4, and vol. xvii, nos. 1-2; *Watson Botanical Exchange Club, 45th Annual Report* (from Mr. H. Stuart Thompson); *Year-Book of Pharmacy and Transactions of the British Pharmaceutical Conference*, 1923; *Year-Book of the Rhododendron Association*, 1929; and *The Yellow Dragon* (Queen's College, Hong Kong), vol. xxx.

Numerous pamphlets, usually separates from periodicals, have been received. The principal contributors were:—Dr. P. Aellen, Dr. Agnes Arber, Dr. F. Börgesen, Mrs. Frank Bolus, Dr. J. F. Buchholz, Dr. P. Bugnon, Prof. P. A. van der Byl, Prof. C. J. Chamberlain, Dr. H. Chermeson, Dr. C. Christensen, Dr. L. Cockayne, Prof. T. D. A. Cockerel, Dr. E. B. Copeland, Mr. H. Dahlstedt, Prof. É. De Wildeman, Mr. H. N. Dixon, Prof. K. Domin, Prof. Paul Dop, Mr. W. D. Francis, Mr. C. A. Gardner, Dr. A. W. Hill, Major C. C. Hurst, Prof. D. S. Johnson, Col. H. H. Johnston, Dr. K. Keissler, Dr. R. Lemesle, Dr. W. R. Maxon, Dr. J. F. Molfino, Prof. P. A. Munz, Mr. W. R. B. Oliver, Dr. C. H. Ostenfeld, Dr. F. W. Pennell, Dr. Janet Perkins, Dr. W. Robyns, Prof. E. Rübel, Prof. G. Samuelsson, Prof. C. Skottsberg, Dr. J. J. Smith, Dr. C. G. G. J. van Steenis, Miss E. L. Stephens, Dr. J. Valckenier Suringar, Prof. T. Tanaka, Mr. I. Thériot, Dr. C. W. Wardlaw, Dr. E. E. Watson and Mr. R. P. Wodehouse. Collections of pamphlets have also been received from the Wellcome Chemical Research Laboratories, the Botanical Department of Queen's University, Belfast, Botanical Laboratory of the University of Utrecht, Botanical Institute of the Jagellonian University, Cracow, Institute of Botany of the University of Geneva, Botanical Institute of Kyoto Imperial University, Technological Museum, Sydney, Botanical Department of the University of Melbourne, Department of Plant Pathology of Cornell University Agricultural Experiment Station, and the Missouri Botanical Garden, St. Louis.

A large collection of letters relating to the flora of the Near East, addressed to Dr. W. B. Turrill, after being arranged, mounted and indexed, has been presented by him and has now been bound in two foolscap folio volumes.

Mr. N. E. Brown has presented a copy of W. J. Burchell's map of the extratropical part of Southern Africa, published in 1822, mounted on linen. It was given by Burchell to Mr. Thomas Cooper before the latter started on his journey to South Africa in 1859. Two maps of Eastern Bolivia, illustrating his travels, have been received from Mr. D. Bourke-Borrowes.



# **List of Staffs of the Royal Botanic Gardens, Kew, and of Botanical, Horticultural and Agricultural Departments in the Empire, in correspondence with Kew.**

*\* Formerly on the temporary staff at Kew.*

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## **Imperial Bureau of Plant Genetics (for herbage plants), Aberystwyth.—**

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## **Imperial Forestry Institute, University of Oxford.—**

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## AUSTRALIA.

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Australian Forestry School, Canberra.—

*Principal*—C. E. Lane-Poole (acting).

Federal Capital Territory Branch, Department of Home Affairs.—

*Chief Forest Officer*—C. R. Cole, B.Sc.

Council for Scientific and Industrial Research.—

Division of Plant Industry.—

*Chief*—B. T. Dickson, Ph.D. *Plant Pathologists*—H. R. Angell, B.S.A., M.A., Ph.D., W. M. Carne, F.L.S., P. H. Jarrett, M.Sc., W. L. Geach, B.S.A., A. V. Hill, B.Agr.Sc. *Plant Introduction Officers*—A. McTaggart, M.Sc.Agr., Ph.D., W. Hartley, B.A. *Plant Geneticists*—J. R. A. McMillan, M.A., B.Sc.Agr., H. F. Smith, M.Sc.Agr. *Botanists*—C. Barnard, M.Sc., J. Calvert, M.Sc., F.L.S. (*Weeds*).

**New South Wales.** Sydney.—

Department of Agriculture.—

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Hawkesbury Agricultural College.—

*Principal*—E. A. Southee, O.B.E., M.A., B.Sc., B.Sc.Agr.

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*Chairman*—E. H. F. Swain.

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National Herbarium (South Yarra).—

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*Dominion Cerealists*—L. H. Newman, B.S.A. *Dominion Agro-  
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B.S.A. *Junior Botanist and Librarian*—R. A. Inglis, B.A.  
*Plant Pathologists*—F. L. Drayton, B.S.A., A. W. McCallum,  
B.Sc.F., M.A., H. N. Racicot, B.A., I. L. Connors, M.A., J. B.  
MacCurry, B.S.A., Miss I. Mounce, M.Sc., Ph.D.

Plant Pathologists in Charge, Dominion Field Laboratories.—

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(*Kentville, N.S.*), D. J. MacLeod, M.A. (*Fredericton, N.B.*),  
C. Perrault (*Ste Anne de la Pocatière, P.Q.*), G. H. Berkeley,  
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Department of Lands and Forests.—

*Deputy Minister and Provincial Forester*—E. J. Zavitz.

University.—

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Sifton, M.A., Ph.D. (*Ecology*), G. H. Duff, M.A., Ph.D.

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*Professor of Horticulture*—T. G. Bunting, B.S.A.

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*Pathology*—G. R. Bisby, B.S., Ph.D.

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Department of Lands, Victoria.—

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Forestry Department, Accra.—

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## University of Otago, Dunedin.—

*Lecturer in Botany*—J. E. Holloway, D.Sc., F.N.Z.Inst.

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## Auckland Institute and Museum.—

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**Canterbury,** Christchurch.—

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## Botanic Gardens.—

*Curator*—J. Young.

**Otago,** Dunedin.—

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## Botanic Gardens.—

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Sandakan.—

*Conservator of Forests and Director of Agriculture*—D. D. Wood, B.Sc., M.For.

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Livingstone.—

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*Senior Assistant Conservator of Forests*—D. Stevenson, B.Sc.

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**SARAWAK.**

Kuching.—

*Conservator of Forests*—D. E. Calver, M.A., B.Sc. *Director of Agriculture*—J. S. W. Bean.

**SEYCHELLES.**

Department of Agriculture.—

*Director*—P. R. Dupont.

**SIERRA LEONE.**

Agricultural Department, Freetown.—

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Forestry Department, Freetown.—

*Conservator*—E. Macdonald.

**SOUTH AFRICA.**

**Union of South Africa.**—

Department of Agriculture.—

Division of Plant Industry, Pretoria.—

*Chief of Division and Director, Botanical Survey*—I. B. Pole Evans, C.M.G., M.A., D.Sc., F.L.S. *Principal Botanist*—E. P. Phillips, M.A., D.Sc., F.L.S. *Botanists*—A. O. D. Mogg, M.A., C. D. B. Liebenberg, B.Sc., C. A. Smith, B.Sc. (*Kew*), A. P. G. Goossens, B.Sc., R. A. Dyer, M.Sc. (*Grahamstown*), Miss M. Henrici, Ph.D. (*Fauresmith*), Miss H. Forbes (*Durban*). *Botanical Survey Officer, Cape Town*—R. Marloth, M.A., Ph.D. *Botanical Assistant*—Miss I. C. Verdoorn. *Principal Plant Pathologist*—Miss E. M. Doidge, M.A., D.Sc. *Cryptogamic Herbarium, Mycologist-in-Charge*—Miss A. M. Bottomley, B.A. *Mycologists*—Miss E. S. Moore, D.I.C., Ph.D., A. Leeman, D.Sc., J. E. van der Plank, M.Sc., V. A. Wager, M.Sc. (*Pretoria*), R. Davies, B.Sc. (*Cape Town*), A. P. D. McClean, M.Sc. (*Durban*).

SOUTH AFRICA.—*contd.*Union of South Africa.—*contd.*

Department of Forests, Pretoria.—

*Chief Conservator*—C. E. Legat, B.Sc.

University of South Africa.—

Bloemfontein (Grey University College).—

*Professor of Botany*—G. Potts, B.Sc., Ph.D.

Grahamstown, (Rhodes University College).—

*Professor of Botany*—N. J. G. Smith, B.Sc., Ph.D.

Pietermaritzburg (Natal University College).—

*Professor of Botany*—J. W. Bews, M.A., D.Sc., F.L.S.

Wellington (Huguenot University College).—

*Lecturer in Botany*—Miss S. Maritz, M.Sc.

Potchefstroom (School of Agriculture).—

*Botanist*—G. C. Theron, Ph.D.

University of Pretoria.—

*Professor of Botany*—C. E. B. Bremekamp, Ph.D.

## Cape of Good Hope Province.—

Cape Town.—

National Botanic Gardens, Kirstenbosch, Newlands.—

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*Curator*—J. W. Mathews\*, *Karoo Garden, Whitehill* ; *Curator*—  
J. Archer.

University of Cape Town.—

*Harry Bolus Professor of Botany*—R. S. Adamson, M.A. *Harold*

*Pearson Professor of Botany*—R. H. Compton, M.A.

South African Museum, Herbarium.—

*Assistant-in-Charge*—Miss S. Garabedian, B.A.

Bolus Herbarium.—

*Curator*—Mrs. F. Bolus, B.A. *Assistants*—N. S. Pillans, Miss P.

Barnes, B.Sc., Miss M. Lavis, Miss I. Arbuthnot. *Artist*—

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Municipal Gardens.—

*Director of Parks and Gardens*—A. W. v. d. Houten\*.

Stellenbosch.—

University of Stellenbosch.—

*Professors*.—*Botany*—G. C. Nel, B.A., Ph.D. *Phytopathology*

*and Mycology*—P. A. van der Bijl, M.A., D.Sc.

Grahamstown.—

Albany Museum.—

*Hon. Curator of Herbarium*—R. A. Dyer, M.Sc.

Municipal Gardens and Plantations.—

*Curator*—E. Lever.

Kimberley.—

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*Curator*—Miss M. Wilman.

Port Elizabeth.—

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*Curator*—G. Lockie.

Graaff-Reinet.—

Botanic Gardens.—

*Curator*—W. B. Sanday.



**SOUTH AFRICA.—contd.****Cape of Good Hope Province.—contd.—**

Uitenhage.—

Magennis Park.—

*Curator*—G. Cartwright.**Province of Natal.—**

Cedara School of Agriculture.—

*Botanist*—G. A. Gill, M.A.

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*Superintendent*—W. J. Newberry.\***Province of the Orange Free State.—**

Bloemfontein.—

Gardens and Public Parks.—

*Curator*—A. F. Baker\*.

Glen.—

School of Agriculture.—

*Botanist*—J. Morris, B.Sc.**Transvaal Province.—**

Pretoria.—

Transvaal Museum.—

*Curator of Herbarium*—Miss A. A. Obermeyer.

Johannesburg.—

University of the Witwatersrand.—

*Professor of Botany*—C. E. Moss, M.A., D.Sc., F.L.S.

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**SOUTHERN RHODESIA.**

Department of Agriculture, Salisbury.—

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**STRAITS SETTLEMENTS AND FEDERATED MALAY STATES.****Straits Settlements.—**

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**Federated Malay States and Straits Settlements.—**

Agricultural Department, Kuala Lumpur.—

*Director*—H. A. Tempany, D.Sc. *Agricultural Instructor (Malay**Officers)*—G. E. Mann, M.C., M.A.

**STRAITS SETTLEMENTS.—contd.****Federated Malay States and Straits Settlements.—contd.—**Agricultural Department, Kuala Lumpur.—*contd.*—

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Division of Economic Botany.—

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Pathological Division.—

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Imperial College of Tropical Agriculture, Trinidad.—

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**Jamaica.—**

Department of Science and Agriculture.—

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Agricultural Society.—

*Secretary and Treasurer*—L. L. Carrington.

**Leeward Islands.—**

**Federal** (Antigua). Department of Agriculture.—

*Government Chemist and Superintendent of Agriculture*—A. E. Collens.

**Antigua.** Agricultural Department.—

*Agricultural Superintendent*—F. H. S. Warneford, M.A., B.Sc. *Agricultural Assistant*—A. Gallwey.

**St. Kitts—Nevis.** Agricultural Department.—

*Agricultural Superintendent*—R. E. Kelsick. *Agricultural Instructor (Nevis)*—W. I. Howell.

**Dominica.** Botanical Department.—

*Curator, Botanical Gardens and Agricultural Superintendent*—F. G. Harcourt\*. *Assistant Agricultural Officers*—F. L. Squibbs\*, H. P. Pidduck, R. A. Kitching.

**Montserrat.** Agricultural Department.—

*Curator*—C. A. Gomez.

**Virgin Islands.** Agricultural Department, Botanic Station.—

*Curator*—J. L. Illingworth, M.A.

**Trinidad and Tobago.** Department of Agriculture.—

*Director*—E. J. Wortley, O.B.E., F.L.S. *Assistant Director*—S. M. Gilbert, B.Sc.(Agr.). *Mycologist*—F. Stell, B.Sc., A.R.C.S. *Assistant Botanist*—R. O. Williams\*.

Forest Department.—

*Conservator*—R. C. Marshall, M.A.

**Windward Islands.**

**Grenada.** Agricultural Department.—

*Superintendent of Agriculture*—K. T. Rae. *Agricultural Officer*—W. O'B. Donovan.

**St. Lucia.** Agricultural Department.—

*Superintendent*—E. A. Walters\*. *Assistant Agricultural Superintendent*—R. W. Niles. *Agricultural Officer*—G. M. Glasgow.

**St. Vincent.** Agricultural Department.—

*Superintendent*—T. Jackson\*.

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**WESTERN PACIFIC.****Tonga Islands.—**

Department of Agriculture.—

*Director*—H. P. Ritchie.



**ZANZIBAR.**

Agricultural Department.—

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**INDIA AND BURMA.****Government of India.†**

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*Director*—C. C. Calder, B.Sc., B.Sc. (Agr.), F.L.S. *Assistants for Systematic Work*—T. D. Srinivasan, M.A., R. L. Badhwar, M.Sc. *Curator, Industrial Section*—S. N. Bal, M.Sc., Ph.C., F.L.S.

Forest Department.—

*Inspector-General and President, Forest Research Institute and College, Dehra Dun*—A. D. Blascheck, Oec.D. *Botanist*—R. N. Parker.

Department of Agriculture.—

Imperial Institute of Agricultural Research, Pusa.—

*Director*—W. H. Harrison, D.Sc. (offg.). *Economic Botanist*—F. J. F. Shaw, D.Sc., A.R.C.S., F.L.S. *Mycologist*—W. McRae, M.A., D.Sc., F.L.S.

**Bengal.—**

Forest Department, Darjeeling.—

*Conservator*—E. O. Shebbeare.

Department of Agriculture, Dacca.—

*Director*—R. S. Finlow, C.I.E., B.Sc. *Economic Botanist*—G. P. Hector, M.A., D.Sc.

Royal Botanic Gardens, Calcutta.—

*Superintendent*—C. C. Calder, B.Sc., B.Sc. (Agr.), F.L.S. *Curator of Herbarium*—K. P. Biswas, M.A. *Curator of Garden*—N. Mitra. *Assistant Curator*—M. Jones. *Assistant Curator, Calcutta Gardens*—S. N. Basu.

Agri-Horticultural Society of India, Calcutta.—

*Secretary*—S. Percy-Lancaster, F.L.S.

Lloyd Botanic Garden, Darjeeling.—

*Superintendent*—C. C. Calder, B.Sc., B.Sc. (Agr.), F.L.S. *Curator*—J. E. Leslie\*.

Cinchona.—

*Superintendent of Cinchona Cultivation*—C. C. Calder, B.Sc., B.Sc. (Agr.), F.L.S. *Managers*—(Mungpoo) P. V. Osborne\*, (Munsong) H. Thomas\*. *Assistant Managers*—(Mungpoo) G. H. Fothergill. (Munsong) L. G. Richards\*, P. W. Cresswell.

Government House Gardens, Darjeeling.—

*Curator*—J. T. Johnson\*.

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† Officers of the various Departments will be found under the Provinces and Administrations to which they are attached.

INDIA AND BURMA.—*contd.***Madras.—**

Forest Department, Madras.—

*Chief Conservator*—R. D. Richmond.

Department of Agriculture, Madras.—

*Director*—G. R. Hilson, B.Sc. *Economic Botanists*—K. Ramayya, M. Sc. (*Paddy*), V. Ramanatha Ayyar (*Cotton*), G. N. Rangaswami Ayyangar, B.A. (*Millet*s), D. G. Munro (*Oilseeds*). *Mycologist*—S. Sundaraman, M.A. *Systematic Botanist*—V. Narayanaswami, M.A.

Government Botanic Gardens and Parks, Ootacamund.—

*Curator*—F. H. Butcher\*.

Agri-Horticultural Society, Madras City.—

*Secretary*—B. S. Nirodi, M.Sc.

Cinchona Department.—

*Deputy Director of Agriculture, Cinchona, Ootacamund*—A. Wilson, M.A., B.Sc. *Superintendents*—(*Dodabetta*) ———, (*Nedivattam and Hooker*) W. H. P. Collins, (*Valparai Anamallais*) D. M. Gall.

**Bombay.—**

Forest Department, Poona.—

*Chief Conservator*—H. L. Newman.

Agricultural Department, Poona.—

*Director*—T. F. Main, O.B.E., B.Sc. *Economic Botanist*—W. Burns, D.Sc.

Municipal Gardens, Bombay City.—

*Superintendent*—D. S. Laud.

Empress Botanical Garden, Poona.—

*Superintendent*—N. M. Bhagawat.

Government Gardens, Poona.—

*Superintendent*—E. Little\*.

**United Provinces of Agra and Oudh.—**

Forest Department, Naini Tal.—

*Chief Conservator*—F. Canning.

Department of Agriculture, Lucknow.—

*Director*—G. Clarke, C.I.E. *Economic Botanists*—R. L. Sethi, M.Sc., B. Ram Parshad. *Plant Pathologist*—P. K. Dey, M.Sc. *Deputy Director of Gardens, Saharanpur*—W. Head\* (offg.). *Superintendents of Gardens; Agra*—S. M. Kazrin (offg.), *Allahabad*—W.S. Smith, M.C. (offg.), *Saharanpur*—F. H. Johnson (offg.), *Kumaon*—L. F. Ruse\*, *Lucknow*—R. D. Fordham.

**Punjab.—**

Forest Department, Lahore.—

*Chief Conservator*—C. G. Trevor.

Department of Agriculture, Lahore.—

*Director*—D. Milne, C.I.E., B.Sc. *Associate Professor of Botany, Agricultural College, Lyallpur*—Rai Sahib L. Jai Chand Luthra.

Delhi.—

*Superintendent, Horticultural Department, Old Delhi*—R. H. Locke\*.

*Superintendent, Horticultural Division, New Delhi*—W. R. Mustoe\*, O.B.E.

Lahore, Government Lawrence Gardens.—

*Superintendent*—A. Hardie\*.

Simla, Mashobra, and New Delhi, Viceregal Estate Gardens.—

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INDIA AND BURMA.—*contd.***Bihar and Orissa.**—

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*Conservator*—E. Benskin, M.A.

Agricultural Department, Sabour.—

*Director*—G. S. Henderson.**Burma.**—

Forest Department, Rangoon.—

*Chief Conservator*—S. F. Hopwood. *Forest Botanist*—C. F. Parkinson.

Agricultural Department, Rangoon.—

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Government Botanic Gardens, Maymyo.—

*Superintendent*—C. T. Bogg.

Agri-Horticultural Society.—

*Superintendent*—C. A. Giffening.

Cinchona.—

*Superintendent, Cinchona Cultivation, Burma*—P. T. Russell\*.**Central Provinces.**—

Forest Department, Pachmarhi.—

*Chief Conservator*—C. A. Malcolm.

Department of Agriculture, Nagpur.—

*Director*—F. J. Plymen, C.I.E. *Economic Botanist for Cotton*—  
*Mycologist*—J. F. Dastur, M.Sc., D.I.C.*Second Economic Botanist*—D. N. Mahta, B.A., F.L.S.

Nagpur Public Gardens.—

*Officer-in-Charge*—D. N. Mahta, B.A., F.L.S.**Assam.**—

Forest Department, Shillong.—

*Chief Conservator*—W. R. de G. Jacob.*Director of Agriculture and Industries and Registrar of Co-operative Societies*—Rai Bahadur Kanak Lal Barua.

Shillong, Government Gardens.—

*Superintendent*—R. Badgery\*.**North West Frontier Province.**—*Deputy Conservator of Forests*—G. R. Henniker-Gotley, D.S.O., B.A.*Agricultural Officer*—W. Robertson Brown.**Port Blair and Nicobars, Port Blair.**—*Chief Forest Officer*—G. H. R. Golding.**Indian States.**—**Mysore.** Bangalore.—*Director of Agriculture*—Leslie C. Coleman, M.A., Ph.D. *Director of Horticulture*—G. H. Krumbiegel\*. *Superintendent of Government Gardens*—H. C. Javaraya, F.L.S.

Forest Department, Bangalore.—

*Chief Conservator*—B. V. Ramaiengar.**Baroda.**

State Gardens.—

*Superintendent*—T. R. Kothavala.

INDIA AND BURMA.—*contd.***Kashmir and Jammu.**—

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*Superintendent of Gardens*—M. L. Bohra.**Madras.**—

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